The Chemical Age

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Notes and Comments

Science and Politics

NOT long ago we commented upon the futility of demanding that scientific and other learned men should of necessity take an active interest in politics; at the same time we gave it as our opinion that scientific men and chemists cannot avoid making their contribution to the politics of the world. They should be the architects of the new order and should be consulted at every step by industry, finance, the State and the reformer. We do not mean that scientists should form political parties. Some chemists are flirting far too seriously with the "isms and acies"—the fads of the intelligentsia in many countries that have already made so much trouble in the world—Socialism, Facism, Communism and so forth. We may even add to this the latest " Technocracy," although there is so much more of definite scientific research behind this cult that we hesitate for a second or two before doing so. All these are violent remedies, savouring rather of the unskilled chemist who throws his " experiment " down the sink and starts again. A human experiment cannot be thrown down the sink without causing an infinity of suffering, as has been shown clearly in Russia. We cannot doubt that the world will change, indeed that it must change before we get rid of unemployment. The coming of modern industrial methods will necessitate that, but steady and evolutionary changes are more likely to be successful in the long run and to cause the least suffering to individuals.

The Attitude of the Chemist

SCIENTISTS should know that their work does not consist in devising sudden and drastic means for promoting a new order and a new world but in proceeding steadily step by step towards the ultimate goal whereby everyone in the world will have rather more than enough of the necessities of life, quite a large share of its luxuries and leisure to enjoy both. We are within sight of the fulfilment of the avowed object of engineering—" the direction of the sources of power in nature to the use and convenience of man." We find ourselves with more goods than the wealthy can use, and we term it " over-production," even though the poor cannot buy them at all. We find ourselves with ample leisure, or at least with far more leisure than we ever had before—and we call it " unemployment." The necessity of the world to-day is neither an " ism " nor an " acy," but a simple method that will be accepted by all the greatest nations of allowing all to have as much as is good for them—we do not say " as much as they want," for that would result in a luxurious and immoral world—and of distributing leisure so that man may work less and have more time for leisure. Having produced the machine we must learn how to use it. Those who understand technology and industry are they who must perforce be best fitted to advise; the " politicians," in the present sense of the term, should stand aside. We stress this point in order to indicate the importance of chemists and other professional men taking a sound and balanced attitude, and not allowing themselves to be led astray by the fads of the moment.

Economics of Leisure

WHATEVER the solution may be to our present " unemployment " and " over-production " problems, there can be no doubt that we shall have more leisure in the future. It has been estimated that the work of the world fifty years hence will be done in about four hours daily. The machine is giving us an opportunity to rearrange our lives. The late Lord Melchett, eminent in many spheres of life and pre-eminent in chemical industry, foresaw this. " We are not slaves of the machine," he said, " but its master; the office is not for us to work in but to provide a living. When I say ' a living ' I mean something more than going to an office. Machinery is there to provide us with leisure and not to give more work: transportation is there to give us more time, and not less." Some of the forefruits of this new leisure are already apparent. To those interested we commend an article upon " The Economics of Leisure " in " The Nineteenth Century and After " for May last by Mr. John Benn. There is an increased standard of culture and appreciation of beauty among all classes. The artistic appearance of the things we see and use is ever of growing importance. It is of vital importance that we shall all be better educated so that this leisure time shall be used to improve our skill, or standard of culture, or our physical fitness. Since this improvement of public taste has already started and must continue with ever-increasing velocity, it is a factor with which industrial firms must familiarise themselves. To quote from the article mentioned: " The new leaders of business are endeavouring to introduce the old exclusive standards and to give them to the masses. Mass production is now being adapted to turn out beautiful things in the hands of those to whom beauty has always been an accepted standard.

" This influence is bringing about a change in some branches of industry little short of a revolution, both in the methods and products of manufacturing. Its importance is being recognised by some of the biggest firms in the country." The

chemical industry is not so greatly concerned with the economics of the leisure of the future as are many. It has a variety of products the manufacture of some of which can be speeded up by accelerating the chemical reactions involved, while at the same time the men thus displaced may be required to produce new products not previously known. Some products are made and used on a huge scale, like sulphuric acid and the fertilisers. Others, like drugs and medicinal products, are not produced in quantity, and purity is more important than saving a few pence a pound by the use of the machine. Chemists are ever at work producing new products and inventing new uses both for the new products and for the old ones. New industries arise, such as the plastics industry, so that the chemical industry is still an increasing one. Statistics have just been published in America showing that in 1914 in that country there were 249,000 employees in the chemical industry, whereas by 1929 the number had increased to 465,000. Few old-established industries in any country can show such a record of convincing progress in face of the greatest application of labour-saving methods that, in the course of a short fifteen years the world has ever seen, or possibly will ever see.

An Impressive Record

THE chemical industry—perhaps a better phrase is " the application of chemistry to industrial progress " —is but a century old. We are therefore only on the threshold of the developments which may be expected. Those who would cure the ills of the world may, if they will, give us more leisure, let them reduce working hours or working years so that man can use more of the things that he can make, but let them remember when they are tempted by the " isms and acies " that there are still expanding industries—industries that are actually expanding and that have the power to expand still further given courage and a continuance of man's inventive power. There is much that man can do for himself without taking any drastic step.

The record of the chemical industry is impressive. Consider the record of public health during the past century and then try to estimate where that record would have stood had it not been for the chemicals and disinfectants supplied by the chemical manufacturer. The world is so greatly dependent upon gold for its buying and selling that the wealth of the world and consequently its prosperity owes a debt to the chemist who has shown how by the cyanide process the leaner ores of the gold fields can be worked and the yield of gold increased. The coal fields of every nation yielded only fuel—and that burnt under appalling conditions of waste and smoke—until the chemist intervened: coal is now the starting point of a vast chemical industry and the ultimate base of dyestuffs manufacture. It is true that modern definition sometimes regards the coal mine as " a hole in the ground producing coal and communists "; but that is not the fault of the chemist. The debt that agriculture owes to chemical industry is perhaps one of the most outstanding achievements to the credit of the chemist. It does not seem long since Sir William Crookes gave it as his considered opinion that about this time the world would suffer from a nitrogen famine so that the countryside would be quite unable to produce enough food to keep the growing population of the world. So in 1867 Sir William Kelvin and others estimated the past age of the earth as between 20 million and 400 million years. But Kelvin did not know that chemists would one day discover radium and that physicists would discover the inter-transformation of radiation and matter, whilst Crookes overlooked the power of chemical research. Even so brief a review of a few " high-lights " of scientific achievement brings with it a feeling of breathlessness; a wonderment of what yet is in store; a sense that human knowledge and effort have by no means said the last word; a warning to make haste slowly, lest we find that the cosmos we try to bring into being with a word prove more troublesome than the present apparent chaos.

Standards of Living

THE chemical industry is not without its own particular difficulties. One of these appears to be affecting most nations and is probably one of the principal reasons why we cannot, temporarily at all events, shorten the working day or the working week. We refer to the different standards of living in the various countries as shown by the different rates of wages. Recently published figures, referring, it is true, to the period immedately before the nations went off the gold standard, indicate some remarkable divergencies. If Great Britain be taken as the standard—100—the figures for some other countries are: U.S.A. 225; Sweden 86; Germany 81; Belgium 57; France 53; Hungary 41; China 8. In the electric lamp trade the daily rate of wages in this country is: mechanics, 13s. 9d.; glass blowers, 18s. 4d.; women, 8s. 6d. In Japan the men in this industry are paid less than 1s. a day; and women, 7d. The glass blower in Japan receives 2s. a day, and the bricklayer (the highest paid operative) 2s. 9d. These rates, moreover, include certain payments in kind, such as meals and clothing. British silk workers receive from eight to ten times as much as the corresponding Japanese worker.

Problem of the Neutral Market

CLEARLY the simple faith of an older generation that the superior qualities of Western labour would always be sufficient to counter-balance any advantage that the Eastern nations might possess in lower cost of labour stands in need of revision. There is no longer any monopoly of manufacturing ability; the provision of the machine tends to make the Oriental equal in manufacturing power to the British worker. The standard of intelligence among Japanese workers is high; Japan is an industrial country. Those who know Japan and the Japanese, and who are cognisant of their scientific work, know well that they are rapidly becoming Westernised in their methods and outlook. There can be little doubt that unless the Western nations take measures which will have the desired result of equalising wage rates and the standard of living throughout the manufacturing world, trouble is bound to arise, and in that trouble the Western nations will not come off best. It is true that the different conditions can imperfectly and with a certain amount of friction be neutralised by tariffs, but tariffs will avail nothing in neutral markets. We in England do not willingly pay much more for a home-produced article; still less will the neutral country do so. It will be well for us to look ahead to our difficulties before it is too late.

Maintenance Records and Costs

By J. H. WEST, M.I.Chem.E.

VERY few chemical factories keep systematic records of their plants from the point of view of the life history of the individual items which they comprise. This is a pity, for much exceedingly valuable information can be obtained from such records. If a factory manager were asked why he did not adopt some system of this kind, he would probably reply that it would involve too much clerical work and would cost more than it was worth. Experience shows, however, that, once the system is got under way, little trouble or cost need be involved in keeping it going.

If no records at all have been kept in the past, the task of starting it is a laborious one, calling for energy, patience, and clear-cut ideas as to how the maintenance costs are to be allocated. The first thing necessary is a complete inventory of the contents of the factory, from buildings down to each individual item of plant. Such an inventory ought, of course, always to exist, if only for use in case of fire or other insurance claims. If a new factory is being built, or a new section added, it is a simple matter to prepare such an inventory while the plant is being put in, though this excellent opportunity is almost always neglected. Afterwards it becomes a more difficult task in a factory of any size, and it involves far more work to get all the necessary information together.

The next matter to settle is how the contents of the factory are to be subdivided for purposes of records and maintenance costing. In some cases it may be desired to keep separate records for the manufacture of individual products; in others it may be sufficient to divide the factory into sections, each perhaps producing a number of products. This is purely a question of the particular requirements in a given factory, and no hard and fast lines can be laid down.

Keeping the Records

The best way to keep the records is in a loose-leaf ledger, and the following are the principal headings to be printed on each sheet:—

SECTION .....
Item No. ..... Location .....
Description of item .....
Principal dimensions or characteristics .....
Maker's name .....
Order No. .....
Date put into use .....
Used with .....
Original cost .....
Depreciation rate ..... per cent.
TECHNICAL PARTICULARS.
Drawing Nos. .....
Short specification .....
Reports on inspections (with dates) .....
Repairs or alterations carried out (with dates and cost) .....
Approximate hours worked per annum .....

Few of these headings require any comment. The item number may conveniently be stamped or painted on the apparatus to assist in easy identification at a later date. The heading "Used with . . . ." refers to the chemicals or operation for which the apparatus is being used. Under the heading "Original cost . . ." the cost of carriage and erection may be included if desired. As regards the short specification under "Technical Particulars," this need only be brief if drawings exist or the order file contains the maker's original specification which can be turned up when full information is required. In the case of plant bought second-hand, however, there are usually no drawings and the particulars are scanty, so that it is best to include a fairly full specification.

Allowance for Depreciation

Sometimes space is provided for entering the actual book value of the item year by year after allowing for depreciation, repairs, and alterations. This is ideal, but it involves a great deal of clerical work, and it is usually sufficient to deal with depreciation, etc., on the total value of plant carrying the same rate of depreciation in a given section. In this and other matters it is simply a question of how detailed the information is required to be, and it must be emphasised that it is far better to reduce the amount of detail as much as possible and have the sheets kept up to date than to start an elaborate system which is allowed to fall into arrears or lapse altogether after a time.

Much thought should be expended when inaugurating such a system in order to minimise the work involved in keeping it going. In the original entries also, all unnecessary work should be avoided. For instance, where there are a number of identical items, there must be a separate sheet for each, but the full particulars need only be entered upon one, and reference be made to this on the others.

As regards individual items of plant or equipment these records present no difficulties, but when one gets on to such items as pipework, laboratory apparatus, loose tools and equipment, the matter is not so simple, but these difficulties can be overcome by applying a little common sense. Pipework can be lumped together as a whole for each section, or better be divided into steam, water, gas, and process pipelines, within the buildings. Perhaps the greatest difficulty arises in connection with equipment outside the buildings; pipe-lines and conveyors connecting buildings, outside lighting equipment and power cables, main supply lines for steam, water, etc., the cost of which has to be divided between a number of sections. All these, however, can be put into convenient sections of their own for record purposes, and the question of allocation is one really outside the keeping of records.

The Value of Complete Records

If a chemical manufacturer wants to know at any moment what his factory contains, in plant and value of plant, it is obvious that he must keep records something on these lines. They will be of great value to him in ascertaining what the actual depreciation of the various classes of plant turns out to be as compared with the book figure taken. The income tax authorities are now asking in many instances for an inventory to be taken. Apart from all this on the financial and accounts side, these records are of great value to the maintenance or chemical engineer, for they enable him to make accurate comparisons between different makes and types of apparatus, doing the same duty, as regards their life and maintenance cost in relation to their original cost. He can, for instance, find out definitely whether A. and Co.'s plant, which is expensive, is really worth the difference in cost, as compared with that of B. and Co., which is much cheaper, but not so well constructed.

Apart from the inventory ledger, much thought should be expended on the factory and as regards the system of costing, repairs and maintenance, which should be as simple and clear as possible. Each man on the maintenance staff should have a job card on which he can enter the number of hours worked on each job. If the item numbers on the record sheets are marked on the plant he can put these on his card, and no doubt then exists as to exactly which item he has been working on. At the end of the week the maintenance foreman will, of course, check over the cards to see that mistakes have not been made.

For materials from stores the same system can be used, the item numbers being entered on the stores vouchers. In the case of an indent on the purchasing department for new parts, the same thing applies. The maintenance engineer can then easily prepare, or have prepared, periodically, a statement showing the maintenance costs in time and material under the various items, and it is not a long job to enter these in the record ledger.

If the office and the factory are not at the same place, the best plan is to keep the record ledger in duplicate, one copy being kept at the office and the other at the factory. The maintenance engineer can then enter his copy direct, and send it to the office periodically for their copy to be brought up to date. If the maintenance engineer is to get any value out of the system it is obvious that he must have access to the records. A copy kept at the office and inaccessible to him is valueless from the technical point of view.

The Problem of Light Exposure Tests

By JULIUS GRANT, Ph.D., M.Sc., F.I.C.

THERE are two obvious methods of obtaining exact data on the behaviour of a substance in light. One is to expose it under standard conditions to light itself (*e.g.*, the sun) for a definite period of time. The other method is to use an artificial source of light which may either be equivalent in intensity and quality to the sun, or else equivalent in quality but relatively greater in intensity, so as to accelerate the fading effect. It is usually necessary in both cases to ensure that the conditions of the experiment are carefully controlled, as temperature and humidity are also important factors.

On first consideration the intense source of artificial light would appear to be the best solution of the problem, but unfortunately it is not so simply solved. What we call daylight is a mixture of a considerable number of rays of various wave-lengths extending from the ultra-violet to the infra-red, and there is good reason to believe that the individual rays exert different effects on substances. Certainly the rays at the violet end of the spectrum are generally most potent, but these in themselves are also very numerous. Thus two rays which respectively exert a potent and a slight effect on one dye may behave in exactly the reverse way with another, and when it is remembered that the effect which it is desired to reproduce is the resultant of the combined effects, great and small, of all the visible and invisible rays of the sun's spectrum, the complexity of the problem is apparent. It therefore seems as if an exact accelerated fading test is an impossibility, except in special cases where the wave-lengths of the most potent rays are known. Where the change produced by light is invisible to the eye in ordinary light such as with films of nitro-cellulose (W. Mager "British Industrial Finishing," 1931, *2*, 190) an indirect method of assessment must be devised.

Popularity of the Carbon Arc

So far as artificial exposure tests are concerned the two principal sources of light are the mercury-vapour lamp and the carbon arc. Both give a radiation particularly rich in ultra-violet light, and although both may be improved in this respect by the use of suitable filters, the spectrum of the latter is the better approximation to that of the sun. For this reason the carbon arc is on the whole the more popular, as with the textile industries. The actual apparatus usually consists of a central arc around which are arranged a number of boxes containing the specimens to be exposed, with temperature and humidity control.

A considerable amount of work has been carried out with the mercury-vapour lamp. It has been applied with varying degrees of success to dyestuffs, to paper intended to stand tropical climates, and to paints, rubber, leather and textiles. For example, Weightman ("Rubber Age," N.Y., 1928, *23*, 75) has shown that the deterioration of strength and colour in rubber may be indicated in this way, and although he does not consider that the effect of sunlight can be wholly reproduced, B. B. Evans ("Ind. Rubber Inst. Trans." 1930, *5*, 442) believes that useful indications may be obtained if the conditions of the test are strictly standardised, particularly with respect to the wavelength of the light used. The method has been applied not only to colour tests, but also to the cracking of rubber goods, *e.g.*, the side-walls of tyres. Paints also provide an interesting example of the different values of the carbon and mercury-arcs, since the Paint Research Station use the former for testing certain dyestuffs (notably those of the azo-type), and the latter to estimate the degree of blackening of chrome pigments. P. G. Nagle ("Rubber Chem. Tech.," 1928, *1*, 284) has an interesting test for lithopones in which the blackening on exposure is acceletated by the addition of glycerine, and this procedure suggests numerous possibilities in other directions.

Paper Fading Problems

For work with paper the mercury-vapour lamp seems to be favoured. The problems encountered fall into two main categories, the more important being the testing of coloured papers, which are intended to stand exposure to light in shop windows, etc. Here the same considerations apply as to dyestuffs except that they are modified by the fact that the nature of the paper has an important influence. The *pH* value and salt content (due to residues of bleaching materials alum, etc.) are obviously important factors in deciding whether a dye will remain stable, and there is reason to believe that the type of the loading material used, and even the nature and degree of de-lignification of the fibre, may also play a part. Due caution should be exercised in interpreting fading results; for example, a book-jacket which had faded badly was found to be quite stable to light, and the cause of the trouble was the acid-laden air of the railway station in which it had been exposed. The other aspect of paper work refers to white, or nearly white, papers, which show a gradual yellowing on keeping. The changes which occur in this case usually take longer to develop and are rather more deep-seated than the ordinary fading of a dye in light, since they are probably bound up with the residual chemicals in the paper, and with the structure of the cellulose itself. Since they are greatly accelerated in tropical climates there is reason to believe that the effect of heat also comes into account. It cannot be claimed, however, that either the mercury or carbon-arc is completely satisfactory for work of this nature. In some instances pieces of the same dyed paper have been exposed to the sun, and to each of these sources of light, with different fading results in each case.

Fluorescence Changes

From these results it would appear that except for routine testing and instances where the actual reaction of a substance towards ultra-violet light is known, accelerated testing in this way is too unreliable to be of much use. There is, however, a further aspect to the problem which has hitherto not been taken fully into account and which merits further attention. It is well known that in ultra-violet light (particularly the light of the mercury-arc) many substances, especially dyes, show a characteristic fluorescence, which is sufficiently marked to be used as a means of identification. On exposure to such rays, this fluorescence changes very markedly, and in general, the substances which show the greatest change are those which are least resistant to light. It is interesting to note that such changes in fluorescence may be unaccompanied by any change visible in ordinary light; and that this applies also to specimens exposed to sunlight. In such cases, therefore, the mercury-arc acts, so to speak, as a magnifying agent and serves to render the changes visible before they can be seen in ordinary light. E. H. Riesenfeld and T. Hamburger ("Pap. Fabrik," 1931, *29*, 164) have applied this method to paper, the time in seconds required to produce a definite change in fluorescence being taken as an indication of the relative fastness to light. Mager (*loc.cit.*) gives similar data for collodion films, and the method has also been applied to the weathering of paint; L. Meunier and G. Rey ("Compt. rend.," 1926, *183*, 596) mention that prolonged exposure modifies and eventually destroys the fluorescence of wool. As an extreme example of the relative potencies of sunlight and the light of the mercury-arc for this purpose it may be mentioned that in one case (a dye) periods of 48 hours and 15 minutes of exposure, respectively, were required to produce the same change in fluorescence.

Future Developments

To sum up, it may be stated that sunlight is too slow for routine work and too variable in quantity to provide an exact method. Ultra-violet light (particularly from the carbon-arc) is rapid and provides an exact experimental method, although the results are not always in agreement with those obtained in sunlight, in general they show whether a substance will fade, but not how it will fade. Change in fluorescence under the mercury-arc is a rapid and reproducible indication of the degree of fastness, and is worthy of further investigations. Future developments will probably be along these lines indicated for rapid routine tests on substances whose probable response is already known, while for work where time is no object a powerful source of light equipped with filters so as to give it exactly the same spectrum and relative intensities of the various rays of sunlight will be used.

Absorption of Direct Dyestuffs by Cellulose

Some Notes on Current Research

A PAPER on "The Absorption of Direct Dyestuffs by Cellulose," was presented by S. M. Neale and W. A. Stringfellow, of the Manchester College of Technology, at the annual conference of the Textile Institute at Harrogate on June 7-9. Following are extracts from the paper.

WHILST many attempts have been made by scientific workers to determine accurately the absorption of dyestuffs on cellulose materials, this problem has only recently been solved in a satisfactory manner. Quantitative chemical methods, such as determination with titanous chloride, for example, have been put forward, but have proved unsuitable for routine purposes. The most serious obstacle to the use of chemical methods lies in the fact that on dyed materials the proportion of colour to substrate is as a rule small, so that large amounts of the latter are required for each estimation. A suitable micro-chemical technique might overcome this difficulty, but no such technique has yet been found.

The alternative lies in physical or colorimetric methods. The direct determination by optical means of the colour content of a textile material would be the ideal, but the difficulties here are obvious and probably insurmountable. The solution to the problem has been found in the discovery that certain solvents will strip the dyestuff quantitatively without destroying its colour. A mixture of pyridine and water is an effective and convenient stripping agent for direct cotton colours.

Colorimetric Methods

Once the dye has been removed its estimation in the solution is readily effected by means of a good modern colorimeter of the Dubsocq type, in which the unknown solution is matched against a standard solution of the pure dyestuff by altering the depths of the respective liquid columns. The accuracy attained, when the precautions usual in colorimetry have been observed, depends largely on the good design of the instrument. We have found the Leitz colorimeter, simple Dubsocq pattern, capable of estimating dyestuffs—with the exception of yellows—within 1 per cent. For yellows a highly intense light source, followed by a dense filter passing violet light only, is necessary, but even under these favourable conditions the human eye fails to give an accurate result. The use of the potassium photo cell should overcome this difficulty in the estimation of yellow dyes, but this application is still in the experimental stage.

To carry out exact measurements on dyestuff absorption, so as to arrive at a full understanding of the factors which influence the amount of colour absorbed, it is necessary to work out a technique not only for the accurate estimation of the latter, but also for the carrying out of the dyeing process under strictly controlled experimental conditions. To attain this end we have found it necessary to use chemically pure dyestuffs, prepared from the technical materials by repeated salting out with sodium acetate and alcohol. It has also been necessary to maintain a constant temperature within 0.2° C.; to guard against contamination from the vessels by the use of silver supports and resistance glass dyebaths, and to prevent evaporation by using mercury sealed ground-on condensers. In experiments on rate of absorption agitation of some kind is necessary. To avoid troublesome corrections it is generally desirable to use such a large ratio of liquor to material that the concentration of the dyebath is not seriously reduced by the absorption of colour. The colorimetric estimation of absorbed dye, which is quite feasible with only one-twentieth of a milligram available, makes possible the fulfilment of this last condition.

Accurate Colour Measurement

Accurate measurements of the absorption of several selected colours have been made. In order to make possible a theoretical treatment of the rate of absorption, we have so far used the plan viscose sheet known as "Cellophane" in most of our work. Using cellulose sheet, and maintaining constant all other factors such as dyestuff concentration 0.05 g/l, salt concentration 5.0 g/l, and temperature 90° C., it was found that the absorption of dyestuff is rapid at first and gradually slows down until a final equilibrium is reached. The outer surface of the sheet is immediately dyed, and the colour then diffuses or spreads gradually until it is uniform across the section. This ultimate uniformity of distribution has been checked quantitatively by a delicate experiment in which the outer surfaces of a dyed sheet have been scraped off and their dye content compared with that of the interior. A comparison of the absorption of certain direct dyestuffs is given in Table 1.

TABLE I.

THE ABSORPTION OF DYESTUFFS BY VISCOSE SHEET AT 90° C

Concentration of dye, 0.05 gm./litre.
Concentration of NaCl, 5.0 gm./litre.

Dyestuff	Weight of Cellulose Sheet milligrams per square centimetre	Equilibrium Absorption gm. of Dye per 100 g. Cellulose	Mins. for Half Saturation	Apparent Diffusion Coefficient. $cms^2/min. \times 10^8$
Heliotrope 2B ..	5.12	0.121	2.5	92.0
Fast Red K ..	5.58	0.42	6	30.4
Sky Blue FF ..	3.21	0.97	10	8.0
Benzopurpurin AB	2.92	3.1	15	4.6
Chlorantine Fast Green BL ..	3.01	1.20	40	1.73

Differences between individual dyestuffs are striking, and except in the case of Chlorantine Green BL, a dyestuff of somewhat different structural type, the absorption value rises as the time for half saturation increases. Recent experiments show, however, that this correlation only holds good in a restricted sense, and it even appears that the order of the dyestuffs in such a table of properties may to some extent depend on the particular form of cellulose used. Quantitative measurements such as these nevertheless afford a tentative basis for a scientific classification of dyestuff properties. These colours standing high in the table show poor affinity and washing fastness but high penetrating and levelling power, whilst those at the bottom of the table show practical characteristics at the other extreme.

Concentration of Neutral Salts

The outcome of a number of experiments on the effect of added electrolytes was summarised as follows: (a) Chemically pure dyestuffs are in general absorbed by cellulose to a quite negligible extent; (b) the gradual addition of any neutral salt to the dyebath steadily increases the equilibrium absorption value; (c) the apparent diffusion coefficient (the inverse of the half-saturation time) at first increases, reaches a maximum, and then decreases with increasing concentration of added salt; (d) the relative effects of different salts are not in accord with the "Valency Rule" or any of the usual generalisations on the coagulation of colloids.

If the concentration of added salt is maintained constant, the absorption at equilibrium rises steadily with increasing concentration of dyestuff in the solution, approximately in accordance with the equation—

$$D = kC^n$$

where D is the amount of dye absorbed, C the dyebath concentration, and k and n are constants. The value of n ranges between 0.3 and 0.7, the lower figure indicating that the absorption only increases very slowly with rising concentration of the dyestuff. It has been found that the absorption is, as regards dye concentration, a truly reversible one—there is no hysteresis as in the absorption of water by cellulose. The same final absorption value is reached if two samples, one undyed and the other previously dyed in a highly concentrated solution, are allowed to stand in the same dyebath.

Temperature of Dyeing

The usual technical belief is to the effect that the absorption of different dyestuffs may be affected in opposite senses by temperature rise. Experiments show that this is only true when dyeings are carried out for a constant short length of time. The effect of temperature rise is actually a two-fold one; the absorption at equilibrium is decreased, but the apparent diffusion coefficient or the rate of reaching is increased. These effects are common to all the dyestuffs in-

vestigated, and are indeed very similar in amount. The equilibrium absorption is very roughly halved by 20° C. temerature rise, the apparent diffusion coefficient very roughly doubled by 10° C. rise. The time allowed in technical dyeing is such that certain dyes, such as Heliotrope 2B and Fast Red K, are absorbed practically to equilibrium, so that in these cases the absorption decreases with rise of temperature. The absorption of colours such as Chlorantine Green BL is, however, in dyehouse practice far from equilibrium, so that if the temperature is raised its effect in increasing the diffusion or penetration rates predominates, with the result that a heavier shade is obtained at higher temperatures.

A technique is now available for the ready and accurate estimation of small quantities of dyestuffs on cellulose materials. Full accounts of the authors' work in various aspects are being prepared for publication. Even at this stage, however, the application of their methods to the exact description of dyestuffs and dyed materials might usefully be considered. The following quantitative properties are suggested for the characterisation of dyestuffs: (1) "Affinity"—Amount of equilibrium absorption by a standard cellulose from a dyebath of standard concentration, salt content, and temperature; (2) levelling and penetrating power — apparent diffusion coefficient in a standard cellulose sheet; (3) fastness to washing—proportion of original amount (absorbed in test (1) above) remaining after a standard treatment with hot water or soap solution; and (4) level dyeing on commercial viscose—ratio of amounts absorbed in a standard test by two samples of specially prepared viscose of extreme properties.

Anodic Treatment and Dyeing of Aluminium Castings

By N. D. PULLEN, A.I.C.

THE following extracts are taken from a paper on "Anodic Treatment and Dyeing of Aluminium Castings" which Mr. N. D. Pullen, A.I.C., presented at the annual conference of the Institute of British Foundrymen, held at Cardiff last week.

PROCESSES which are being used commercially for the protection of aluminium and some of its alloys can be divided into three groups, not only as to the electrolytic used but also as to their country of origin, as follows:—Chromic-acid group (British); sulphuric-acid group (American); oxalic-acid group (German). The films produced under these three headings are in many ways distinctive. The chromic-acid films are more or less opaque, and when produced on pure metal are of a pearly-grey colour. When freshly formed they are definitely soft, but the resistance to abrasion shows a marked increase with age. Sulphuric-acid films, on the other hand, are transparent and practically colourless, and in the freshly-formed condition rather harder than those produced in chromic acid. The films produced in oxalic acid are of a third type distinct from the others. They are more or less transparent, but have a distinct yellow tinge which varies in intensity, depending upon the particular manner in which the film has been produced. In the same way the hardness varies from extremely hard brittle films to soft and comparatively flexible ones.

Preparation of Castings

In preparing the castings for anodic treatment a few important rules must be observed, and these apply to all cases whatever the ultimate object. All machining, drilling, polishing, etc., must be completed before the treatment, the casting must be free from foreign-metal insets, particularly brass or copper and the surfaces, particularly of sand castings, must be treated in such a way as to remove all traces of foreign matter which might be adhering to them. The chromic-acid solution has a high-colouring value, and no matter how well the casting may be washed after treatment, there always seems to be enough acid left in some crevasse or other to seep out and form a deep-yellow stain. The result is often unsightly, but for the particular purpose under consideration it is not dangerous, as the film at such points is not damaged. The alternative is to use a colourless electrolyte, such as a sulphuric acid. There will be no staining in this case, but the author is not at all satisfied that it is an entirely safe procedure, since, under atmospheric conditions, a concentration of sulphuric acid would be produced which could re-dissolve the film. There is no risk of this happening in the case of the Bengough process, as the film is not soluble in the chromic-acid solution. Where permissible, small cracks, etc., could be opened out by cutting away the edges, thus enabling them to be washed out more readily.

Decorative Work

Many alloys give films which, whilst they are quite good from a corrosion-resistance point of view, are self-coloured and so of little use for subsequent dyeing operations except where the colour to be applied is similar to the natural tint of the film. Generally speaking, the choice is limited to a few alloys which give a white or nearly colourless film. Apart from the choice of the alloy the results depend to a certain extent on the method of casting, especially in the case of alloys which respond to heat-treatment. No general rule can be laid down; in some instances chill castings give cleaner films than sand, and in others the reverse is true. In the case of sand castings the use of chills is apt to complicate matters, and discrimination must therefore be exercised. If one part of the casting is chilled at a greater rate than that of the rest, the film over that part will be liable to be of a different tint, and in the case of an alloy which is heat-treatable, the subsequent heat-treatment may not entirely remove the difference in tint.

Welding also causes trouble, and if unsightly patches are to be avoided it is essential that the welding rod shall be of the same composition as the material to be welded, as well as keeping the areas of the front of the weld as low as possible. It is sometimes necessary to carry out welding operations on material already heat-treated.

The alloy must be up to standard and more particularly to chemical composition, since this controls to a very large extent the final colour of the film dyed or not. The dyer can control the colour depth on any one batch of articles, but it is not a practical proposition to try to control individuals. If he is supplied with, say 100 articles made from ostensibly the same alloy but in several heats of varying composition, each heat will dye to a slightly different shade. The anodic treatment, especially Bengough's process, accentuates defects and no operator can produce good results from a poor casting. If the result is a failure due to cracks, pinholes, etc., the castings, being themselves at fault, must be scrapped and replaced by good ones. If a highly-polished finish is desired it must be applied to the metal before treatment, since any of the processes permit of little or no control in this direction, and the same applies to matt surfaces.

Choice of the Best Alloy

Deeply sand-blasted surfaces should be avoided where possible, owing to the heavy currents which they consume. In connection with polished surfaces it might be as well to point out that although fine cracks and pinholes can be made to disappear by polishing due to a certain amount of flow in the metal, they reappear in the film. If a perfect film be required a perfect metal surface must be supplied.

The question of the most suitable alloy depends to some extent on the particular process to be followed. Silicon alloys (5 to 13 per cent.) give good films but are self-coloured brown-black in all cases. For the chromic acid process the copper content of copper alloys should not exceed 5 per cent. and the same applies to sulphuric acid. With oxalic acid, however, the copper may be higher (up to 12 per cent.). The films when formed are semi-transparent and practically colourless. For copper-zinc, 2L5 should give satisfactory results by either of the three processes; the films are colourless and can be dyed. Below 8 per cent., zinc alloys may be treated by either process, but above 8 per cent. they are not suitable for either chromic acid or sulphuric; they can, however, be treated in oxalic acid. Where formed the films are colourless in the former cases, brown in the latter. For heat

treated alloys containing copper it can be taken as a general rule that if the amount is over 5 per cent. the results will in all probability be unsatisfactory. It is desirable that wherever possible the copper shall be in solid solution.

The Patent Situation

As far as the author is aware, all the available commercial processes are covered by patents, so that licences to work have to be taken out. This is certainly the case with the Bengough process and with Sheppard's sulphuric-acid process. He is also given to understand that the German Eloxal process is covered in this country as well as the American Alumilite. The patents cover the use of a particular electrolyte, and there are also several specifications covering various methods of treating the film with waxes, oils, etc. Bengough also has a patent covering the process of dyeing an oxide film with aniline dyes, and this patent covers any process of dyeing any film, so that whichever method is used for producing the oxide film, it appears that a licence under the Bengough specifications has to be taken out if the film is coloured.

There is a future for the anodic protection of aluminium and its alloys. There is no doubt whatever but that these methods do give a very high degree of protection against certain types of corrosive action. It is also true that at the moment they give very little protection in certain circumstances, more particularly with alkaline liquids, but there are several indications that this will be overcome in the near future. Dyeing with aniline dyes needs to be considered rather carefully in order to obtain the best results. This is especially necessary in view of the rather large demand which there seems to be for coloured aluminium, both cast and wrought, for interior decoration, and although the organic dyes may drop out, there are great hopes of the inorganic colours which are now being developed.

In the early days aluminium was looked upon practically as an incorrodible metal, but it is now known that this is not strictly true. The protected material is, however, in an entirely different category, and there is every prospect that the adoption of one or other of the processes described in this paper will lead to the greatly extended use of aluminium alloys in the not too distant future. It will be realised that as further experience is gained, and detailed improvements are introduced, the possibilities of protection and colouring will expand more and more.

British Oil Refining Industry

A Review of Operations in 1932

THE throughput of refineries from oil and naphtha produced in Great Britain and from imported petroleum amounted in 1932 to 555,500,000 gal., compared with 630,900,000 gal. in 1931. The output totalled 439,700,000 gal., as against 509,100,000 gal. respectively, of which 160,800,000 gal. and 193,800,000 gal. were fuel oil and Diesel oil, and 159,300,000 gal. and 180,200,000 gal. were motor spirit. The larger proportion of the material treated at the refineries consists of crude petroleum as it comes from the wells, but substantial quantities of other kinds of imported petroleum such as kerosene and heavy oil residues are also treated.

The " Board of Trade Journal " of June 22 published the following statement, compiled from the Customs Trade Returns, showing the imports of crude petroleum during the years 1927 to 1932. The figures include imports of crude distillate :—

Sources of Supply.	1927.	1928.	1929.	1930.	1931.	1932.
	Million gal.					
Persia	479.4	411.1	340.0	338.8	243.4	232.3
Venezuela	100.3	41.4	64.7	85.6	93.5	66.5
Colombia	25.8	28.7	47.5	6.3	—	—
Trinidad	—	5.5	20.9	24.5	7.1	1.2
Mexico	45.3	12.3	13.8	—	—	16.6
Roumania	—	1.0	0.7	—	—	—
United States	11.8	0.6	—	5.7	—	2.3
Peru	—	—	—	—	—	45.1
Other countries ..	2.2	1.5	—	0.1	—	4.4
Total	664.8	502.1	487.6	461.0	344.0	368.4

Throughput and Output

By the courtesy of the companies concerned, the Petroleum Department has been furnished with information relating to the throughput of material at the refineries and the output of products. The throughputs for the past six years were as follows, oil and naphtha produced in this country from shale being shown in addition to imported petroleum :—

	1927.	1928.	1929.	1930.	1931.	1932.
	Million gal.					
Petroleum	755.2	649.2	664.9	652.7	594.4	525.8
Shale oil	43.2	43.1	42.3	41.8	36.5	29.7
Total	798.4	692.3	707.2	694.5	630.9	555.5

The information furnished by the companies indicates, as a result of the treatment of the material included in the foregoing statement, the following quantities of liquid products were obtained, in addition to certain quantities of asphalt, pitch and wax :—

Product.	1927.	1928.	1929.	1930.	1931.	1932.
	Million gal.					
Motor spirit	210.1	158.4	167.7	180.5	180.2	159.3
Other spirit	20.9	35.5	25.4	21.1	20.9	17.0
Kerosene	78.1	84.1	66.8	49.4	53.4	43.0
Gas oil	39.3	29.6	30.8	28.7	35.5	35.2
Lubricating oil	14.0	15.5	21.7	24.3	19.0	19.1
Fuel oil and Diesel oil ..	341.3	276.3	286.9	271.1	193.8	160.8
Other liquid products ..	0.6	1.1	5.0	10.8	6.3	5.3
Total liquid products ..	704.3	600.5	604.3	585.9	509.1	439.7
Percentage of liquid products to throughput ..	88.2	86.7	85.4	84.4	80.7	79.2

Notwithstanding the decline in the imports of crude petroleum from Persia and Venezuela there has been a slight increase in the total quantities of crude oil imported into this country. This is due to the diverson of supplies from Peru and Mexico which hitherto have gone to the United States, probably owing to the imposition since June, 1932, of a tax on all crude oils imported into the United States.

The total throughput at the refineries shows a decrease over last year of 12 per cent. The smaller throughput is reflected in the decreased production of all products except lubricating oil. The percentage of liquid to solid products remains about the same as last year.

The extent to which the refinery output meets the country's requirements is indicated in some measure by statistics published by the Board of Trade, which show for Great Britain and Northern Ireland the import and export trade, the home production and the balance retained in the years 1929 to 1932. Of the total home requirements of motor spirit, the percentage represented by retained home production varied during this period from 16.3 per cent. in 1929 to 11.9 per cent. in 1932. Retained home-produced kerosene represented between 22.2 per cent. and 17.9 per cent. of the total home requirements, while the percentage of home-produced fuel and Diesel oil declined from 44.9 per cent. in 1929 to 27.5 per cent. in 1932.

Some Future Uses of Plastic Materials

Mr. H. V. Potter on Fireproof Qualities

A GREAT many prophesies of the future uses of plastic materials were made by Mr. H. V. Potter, chairman of the Plastics Group of the Society of Chemical Industry, in a lecture at the Science Museum, South Kensington, on June 16. Sir Henry Lyon, who presided, introducing the lecturer, said that many of his friends who had visited the exhibition had been amazed at the variety of things which had been produced from plastic materials.

Plastics, said Mr. Potter, are materials of great versatility and gave scope for great possibilities. No one can say for certain what the future will bring forth; one can only use imagination guided by the tendency of modern research and along the lines on which industry showed possibilities of running. From the evidence before us it seems that we are approaching the end of the age of metals; their place will be taken by plastic materials. The stage has already been reached when the strength of plastic products, weight for weight, is comparable with that of steel and iron. By reinforcing plastic materials with fibrous matter the day might come when it would be possible to produce materials not only as strong as, but considerably lighter than the metals now used in industry and for domestic purposes. It was possible that in the future entire bodies for motor-cars of fire-proof material would be made in one piece. The same might apply to yachts and other craft, which would lend themselves to a similar process of production. We look forward to the day when 99 per cent. of aircraft would be constructed of fireproof plastic materials, so that disasters, such as had happened recently, of air liners catching fire when in flight could never be repeated.

Art and Decoration Purposes

For domestic purposes plastic materials were already in daily use. There were, however, enormous possibilities of expansion. The housewife of the future would have her drawing room panelled with sheets of laminated materials of any colour she might choose. Mankind loved variety and in the future it would be possible, when it was desired to redecorate the house, simply to replace the panels by those of another colour. There would be no need for continual cleaning and polishing. The plastic products would not only be fire-proof, but scratch-proof and unstainable. The whole tendency of modern decorating was towards simplicity. Large flat surfaces of colour replaced the ornate styles of decoration which were the glory of the Victorians. Plastics lent themselves essentially to such treatment.

Rare and high grade natural products for art and decoration purposes were running short and there was every possibility of plastics replacing them. Every year saw the increasing use of substitute materials, and looking far ahead there was no reason why one day the stage would not be reached when even the framework of a house might be made of plastic instead of metal.

Mr. Potter said he foresaw the passing of the age of mass production, in which manufacture was located in large centralised plants and factories. Mass production exercised a stifling effect on initiative and its necessary standardisation of production limited the fulfilment of the taste and desires of the purchaser. He felt that the craftsman would again flourish, but on some higher plane than was the case a century ago. At the present time there is a movement towards simplicity in design, but this will be followed by a period of gradual introduction of accessory ornamentation. Plastic materials lend themselves to imaginative treatment and the artist of the future has great possibilities in these new plastic products as did ever the masters in the past in plaster and wood.

Manufacture of Domestic Ware

Referring to the utilisation of plastics in the manufacture of domestic ware, the lecturer said he saw no reason why in the future cost of production should not be so small that each article, after having been used once, might be thrown away and replaced by another. This would particularly apply to cups, saucers, etc. In the manufacture of furniture the craftsman would in the future exercise his skill and art on the production of a mould possibly weighing several tons to turn out simple, clean and efficient furniture. Alternatively, standardised parts for the construction of furniture would be moulded and the fitter would come into play to assemble these parts into finished chairs, tables and other things. The internal fittings of liners and ships were already being changed in view of recent fires, and cabin fittings of fire-proof plastic sheets were being used extensively. The designs and finishes of the sheets was illimitable. Further, in plant and equipment where metal was detrimental, plastics came into use. Parts of equipment in dye plant had been rendered in plastic material.

It was also reasonable to look forward to all glass being made of synthetic transparent plastic which was less brittle and liable to splinter, and a better heat insulator. Glass so constructed required less fuel to heat it. "Why should not window frames with transparent plastic for glass be moulded complete in one operation?" asked Mr. Potter. Plastic combined lightness with strength and the consequent reduction of weight in any construction showed either cheaper initial cost or cheaper running cost. That might equally apply to the construction of houses, cost of running of ships, trains, cars and aeroplanes. The noise of running machinery, the clashing of gears in motor cars, and the deafening noise of the tube train might in future be reduced to a minimum by the introduction of plastics into their manufacture.

Profit Sharing Schemes

Present Position in the Chemical Industry

IN the group headed "Glass, Chemical, Soap, Oil, Paint, etc.," the figures for profit-sharing and co-partnership during 1932 issued by the Ministry of Labour show that twelve schemes were known to have been in operation at the end of the year. These schemes had 13,800 participants, out of a total of 16,900 employees on the pay-roll of the firms concerned. The tabular statement of the financial results shows that in this group ten schemes provided an average bonus to 13,600 participants of £14 3s. 10d., giving an addition to earnings of 9.3 per cent.—a financial result which places the group second in the list, the first place being taken by the financial group, which to 14,700 beneficiaries paid an average bonus of £37 3s. 6d., or 11.1 per cent. on wages.

The figures for commerce and industries as a whole show that there were 301 schemes in operation, and out of 353,000 employed 185,300 were entitled to participate. Fuller details are given of 232 schemes, under which 157,600 participants (out of 228,500 employed) received an average addition to wages of 5.1 per cent. representing a cash bonus of £9 19s. 10d. per head. During the year one scheme was started and eleven discontinued. One of the withdrawn schemes was concerned with a chemical manufacturing concern having 43,000 employees, the reason given being that a scheme of a different type—evidently not coming within the accepted definition of profit-sharing—had been substituted.

In the co-operative section of the report, a total of fifty schemes in all branches of production had 10,520 beneficiaries, who received an average bonus of £5 16s. 4d., or 5.3 per cent. addition to earnings for the year. Taking all businesses (competitive concerns and co-operative societies), the Ministry had knowledge of 469 schemes which were in operation during 1932. There were 220,000 employees entitled to participate, out of a total of approximately 390,000 employed. Financial results were given in regard to 395 schemes, an average bonus of £9 3s. 11d. being paid. Compared with the preceding year, these figures show a decline, the corresponding details for 1931 being 409 schemes of which particulars are announced, and an average bonus of £10 1s. 11d.

From a comparative diagram accompanying the report, it is clear that, judging by the number of workers entitled to participate, profit-sharing gradually increased in favour from the war years till the peak was reached with 260,000 participants, in 1929. Since that year a steady decline is noticeable.

Letters to the Editor

The Editor welcomes expression of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

Insurance of Crop Risks

SIR,—I have followed with interest the correspondence in your columns regarding Sir John Russell's suggestion that the time will come when the forecasting of crop yields will be put on an actuarial basis. The two factors which he mentions as being of primary importance are fertilisers and weather, and it is perhaps not sufficiently realised that the researches at Rothamsted, Jealott's Hill and elsewhere have already made it possible to forecast with considerable accuracy the average increase in yield over a series of years to be anticipated by the use of a given quantity and type of plant food on a given type of soil.

The present difficulty is, of course, that these figures can only be average ones over a period of several years, since variations from the average are large in individual years owing to varying meteorological conditions. The fact remains, however, that a considerable amount of critical data regarding the effect of fertiliser treatment is available for study and statistical analysis. When the effects of the weather have been studied with equal care we shall be within measurable distance of Sir John Russell's ideal.

Finally, one cannot refrain from mentioning a point that has not yet been touched upon—what would be the psychological effect on the farmer of removing his standard cause for legitimate complaint? However, perhaps even such intangible imports as rainfall and sunshine may ultimately be circumscribed by quota restrictions.—Yours faithfully,

F. C. O. SPEYER.

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Trade with Italy—A Favourable Balance

SIR,—Advocates of a reduction in the "adverse" balance of merchandise trade between Great Britain and other countries will note with interest a striking recent change which has taken place in the balance of our trade with Italy, where an adverse balance has been converted into a favourable balance. During the quarter ended March 31, this year, according to the Board of Trade returns, imports into the United Kingdom from Italy and the Italian colonies were valued at £2,255,314, while corresponding exports from the United Kingdom were valued at £2,401,938, leaving a balance in our favour of £146,624. To this amount may be added re-exports, during the quarter, from the United Kingdom, valued at £305,405.

These figures contrast sharply with those of previous years. Thus, in the corresponding quarter last year, British exports to Italy were valued at £2,223,011, against imports from Italy valued at £3,019,428, leaving adverse balance for this country of £796,417. In the corresponding quarter in 1931, our adverse balance was even larger, namely, £980,497.

"While exports as a whole from this country to Italy showed a slight decrease during the past year (from £10,706,215 in 1931 to £9,502,562 in 1932), there was a considerable decline in Italian exports to Great Britain (from £15,188,363 in 1931 to £10,848,827 in 1932)," says the Journal of the Italian Chamber of Commerce in London, "due to a large extent to the depreciation of sterling and to the Customs measures in this country."—Yours faithfully,

M. CAMPBELL-JOHNSTON, M.P., L.C.C.

House of Commons.

Wages in the Dyeing Industry

Executive Approves Application for Increase

THE full executives of the trade unions in the Federation of the Bleaching, Dyeing, Finishing and Calico Printing Trades met at Bradford on June 24, under the chairmanship of Mr. C. Hewitt (Bolton), president of the Federation, to consider the recommendations which the executive committee had made at a meeting at Pendleton on June 16, which were outlined in THE CHEMICAL AGE last week.

At the close of the conference, Mr. A. Shaw, secretary, issued an official statement. The meeting endorsed the propositions of the executive committee, and resolved that immediate application should be made to the Allied Association of Bleachers, Dyers and Finishers, for a meeting to discuss the proposals. It was decided that the main application should be for the establishment of minimum wages of 1s. per hour for adult males (21 years of age and over), and 8d. per hour for females 18 years of age and over. Application will, however, also be made for advances of 5s. and 3s. per week for men and women respectively who are receiving in excess of the 48s. and 32s. minima, and the unions will ask that the wages of juveniles be advanced in proportion. The conference gave consideration to the proposal to limit the present working hours and approved the suggestions made at last week's meeting at Pendleton, particularly that which seeks the establishment of a shorter working week by making the normal starting time not earlier than 7.45 a.m.

At present there is a general 6 a.m. start in the industry, and employers have not found any difficulty in getting their operatives to work 12 hours a day. The Federation intends holding meetings with the object of impressing upon the workpeople the wisdom of a later start, because they cannot get a shorter working week until they have a shorter working day. They are ready to consider any proposal which has for its object a shorter working day. They recognise the importance of the extended running of machinery where continuous processes operate as in the dyeing and finishing industry.

With regard to the wages proposals, the Federation is prepared to continue the existing cost-of-living sliding scale, providing minima are established below which it should not operate. At the moment the cost-of-living addition is calculated on a base wage of 30s. 3d. for an adult male, and provides (with the addition of the 3s. granted when wages were last adjusted) a weekly wage of 44s. 5d. If the proposed 5s. advance are granted, the wage of this operative would be 49s. 5d., and the idea of the Federation is that the sliding scale should not be allowed to operate to such an extent as to reduce this wage more than 1s. 5d., or bring it below the minimum of 48s.

In the case of adult females—who are at present receiving 25s. 8d. per week—they would, if the Federation's proposals are approved, become entitled to an advance of 6s. 4d. (to bring them up to the minimum of 32s. a week), and they would not suffer any reduction if the cost-of-living index figure were to fall, otherwise they would come below the minimum. If the cost of living increased to such an extent as to bring wages in excess of the proposed minima, the Federation would expect the sliding scale to operate all round.

INCREASING signs of improvement have been evident in the German chemical industry since last autumn and the upward trend gained notable impetus in the first quarter of 1933—a development in marked contrast to the steady downward tendency in progress in the first quarter of 1932. Indicative of the more favourable conditions is the increased rate of employment which, while remaining notably below 1931 levels, has been rising gradually but steadily above the level of 1932. Employment in the German chemical industry is better than the average of other industry. It increased 60.3 per cent. of fully employed workers on March 1, 1933, against 58.5 per cent. January 1, 1933, and 57.9 per cent. on March 1, 1932. Much of the improvement is reported due to a quickening of the domestic trade in fertilisers, paints and pharmaceuticals.

The National Physical Laboratory

New Features at the Annual Inspection

NEARLY 2,000 visitors, including the presidents and other officials of a number of chemical organisation, attended the annual inspection of the National Physical Laboratory at Teddington on June 27. They were received in the high voltage laboratory by Sir F. Gowland Hopkins, president of the Royal Society and chairman of the board, Lord Rayleigh, chairman of the executive committee, and Sir Joseph Petavel, director of the Laboratory. Although the adjacent Chemical Research Laboratory, under the direction of Professor G. T. Morgan, was not open for inspection, there was plenty to interest the chemical industry visitors in the engineering, metallurgy, meteorology, physics and electricity departments.

Among the features not shown before was a demonstration of engine tests on oils under working conditions. A small engine mounted on the test bed and driving a brake is used for testing motor cylinder oils as a final test of suitability and to confirm the results of tests on journal friction machines. Examples of the results obtained in research on the resistance of welds and weld metals to repeated loading were also shown for the first time. Electric welding is being increasingly used in many branches of industry, but little information is available as to the behaviour of welds and weld metal under repeated stresses. A research is being carried out at the Laboratory to obtain such information, particularly with reference to the strength of fillet welds of the type which may be used in steel structure. Interesting types of failures obtained in the laboratory tests were available for examination.

Construction of Thin Sheet Metal

In the construction of modern aircraft, thin sheet metal is being used to a large extent in place of fabric as a covering material for wings and fuselage. The weight of the metal is normally greater than that of the fabric that it supplants; but whereas fabric covering is entirely dead weight, the sheet metal may be utilised to carry some of the load. When the sheet metal is loaded in compression or shear in the plane of the sheet, its strength is largely affected by buckling, a form of instability in which the sheet is deflected laterally out of its initial form. By this process large areas of sheet may be almost entirely relieved of stress and the additional stress thereby thrown on other parts of the structure may cause premature failure. The effect of buckling is largely dependent upon edge fixing conditions and upon the ratio of the free width to the thickness of the sheet. Theoretical analysis of the problem has been made and tests on plane panels in compression are now being carried out in order to check the conclusions drawn from the theoretical analysis.

In the course of a study of the properties of metals above their melting point it is found necessary to determine the electrical resistance of molten metals over a range of temperature. The apparatus constructed for the purpose holds the metal in a vertical U-shaped channel in refractory material. Current and potential leads of graphite dip into the limbs of the U-tube, and the furnace is so arranged as to give a steady rate of heating or cooling during the taking of the measurements.

Microscopic Examination of Fractures

For the protection of fractures of metal when it is necessary to make a section through the fracture without injuring its detail, it is usual to deposit a layer of some metal on the surface, so that the section may be cut right through the composite mass. For steel sections there is a great advantage in electroplating with pure iron. For this purpose an apparatus has been constructed in which six specimens may be plated at the same time, thus saving time and labour. The specimens are rotated mechanically in order to produce a uniform deposit. This work was also on view for the first time.

A new electrically heated pressure vessel has been constructed to test the action of alkaline solutions on boiler plate steels at high temperatures. The specimens are kept under tension in the boiler, electrical devices being attached for the purpose of maintaining constant temperature and for detecting fracture of the test-pieces. This work is being carried out with the object of determining the cause of boiler failures under conditions of water supply in which the accumulation of certain impurities in the water may occur.

The X-ray equipment of the Department has been supplemented by the construction of an apparatus for the examination of materials by the diffraction of a beam of electrons generated at about 60,000 volts. Such a beam behaves towards a crystalline solid as if it were composed of rays having a wave-length far shorter than that of any X-rays. It has therefore a great power of resolving fine detail, and can be used to examine very thin surface films, which X-rays would pass through without indicating the structure. The apparatus is intended mainly for use in the study of the thin films formed in the oxidation of molten metals.

Microchemical Analysis

The methods of microchemical analysis, both qualitative and quantitative, offer great advantages in the examination of corrosion products and of the distribution of impurities in an ingot or casting. By using minute quantities of the substance taken for analysis and employing a special technique, accuracy comparable with that of the standard analytical methods may be obtained at much less cost of time and chemicals. Examples of the use of these methods, including the special apparatus devised for the purpose, were on view, together with some of the results obtained in the search for small quantities of impurities in metals.

The method of colour measurement evolved at the Laboratory, by which any colour can be expressed by means of three numbers, has now received international adoption. While the instrument originally evolved for the measurement of colour is receiving increasing commercial application, a need has been felt for a device which more easily measures small differences of shade in similar colours. Such a differential instrument—the first of its type which actually measures small differences of colour on the interntionai system—has now been evolved at the Laboratory and was demonstrated on the occasion of the annual visit. At present this colorimeter can only be used for transparent materials, but it is hoped to extend its application shortly to paints, fabrics, etc.

Lead and Zinc Pigments

Advance Statistics for the United States, 1932

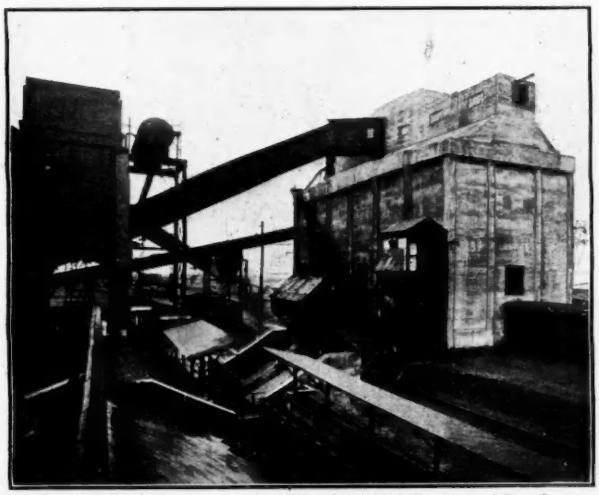
SALES of all lead pigments and of all zinc pigments and salts registered large decreases in the United States in 1932, the declines ranging from 9 per cent. for litharge to 30 per cent. and more for white lead (dry and in oil), basic lead sulphate and zinc chloride. All pigments and salts, with the exception of leaded zinc oxide and zinc chloride, decreased in 1931, following substantial declines in all pigments and salts in 1930. Decreases in lead pigments in comparison with 1931 were dry white lead, 35 per cent.; white lead in oil, 30 per cent.; basic lead sulphate, 35 per cent.; red lead, 27 per cent.; orange mineral, 25 per cent.; and litharge, 9 per cent. Declines in zinc pigments in comparison with 1931 were zinc chloride, 33 per cent.; zinc oxide, 25 per cent.; leaded zinc oxide, 23 per cent.; lithopone, 20 per cent.; and zinc sulphate, 20 per cent.

The lithopone producers reported an annual production capacity of 222,000 tons. Imports of all lead pigments, except red lead, showed decreases in 1932. Exports of white lead were 1,681 tons in 1932, compared with 5,008 tons in 1931, and exports of red lead and litharge were 1,986 tons, compared with 3,087 tons in the preceding year. Imports of zinc oxide were 2,672 tons compared with 1,457 tons in 1931; imports of lithopone dropped from 5,674 tons in 1931 to 4,724 tons in 1932. Over the same period, imports of zinc sulphide declined from 67 tons to 33 tons, zinc chloride from 278 tons to 251 tons, and imports of zinc sulphate from 208 tons to 131 tons. Exports of zinc oxide decreased sharply in 1932, from 5,131 tons in 1931 to 1,261 tons, and those of lithopone decreased from 3,821 tons to 3,212 tons.

New Coke and By-Product Plant at Irlam

A Step Towards Cheaper British Steel

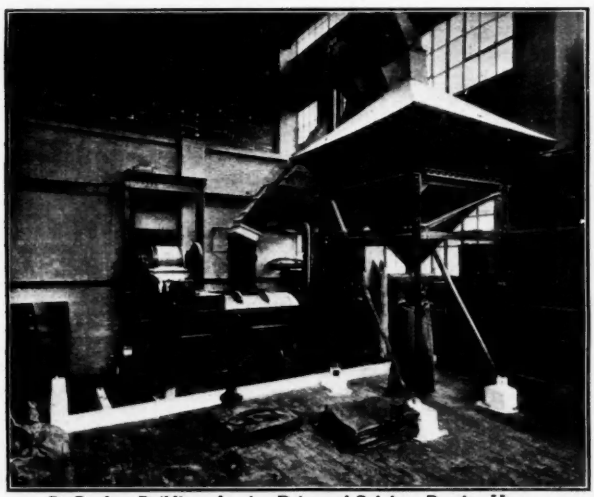
THE development of the coking plant at the Irlam works of the Lancashire Steel Corporation, Ltd., to which we referred in the Metallurgical Section of THE CHEMICAL AGE on June 3, is an outstanding example of modern tendencies in coking technology. The Corporation was formed in 1930 to take over the control of the Partington Iron and Steel Co., Ltd., Pearson and Knowles, Ltd., and the Wigan Coal and Iron Co., Ltd., and it now owns the share capital of Rylands Brothers and the Whitecross Co., Ltd. The coke ovens, blast furnaces and steel works of the combine have now been centralised at Irlam. The new coking plant consists of 51 Becker ovens capable of producing 5,000 tons of coke per week, and the blast furnace plant has a capacity of 7,000 tons of iron per week.



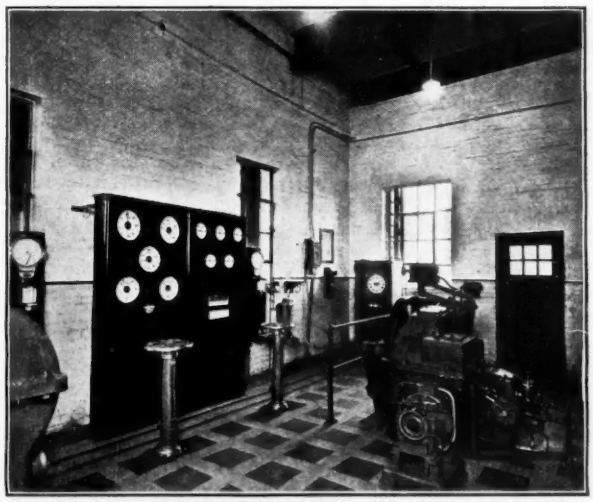
Blending Bunkers, showing also Coke Quenching Station and Bought Coke Wharf.

The economies effected may confidently be expected to result in cheaper steel and thus greatly to enhance the competitive power of the Lancashire steel trade. The coking installation includes coal handling, washing, blending and crushing plant, coke screening and handling plant and by-product recovery plant for tar, ammonia and motor benzol.

In the sulphate plant, sulphate of ammonia is produced both from the ammonia in the gas and from that contained



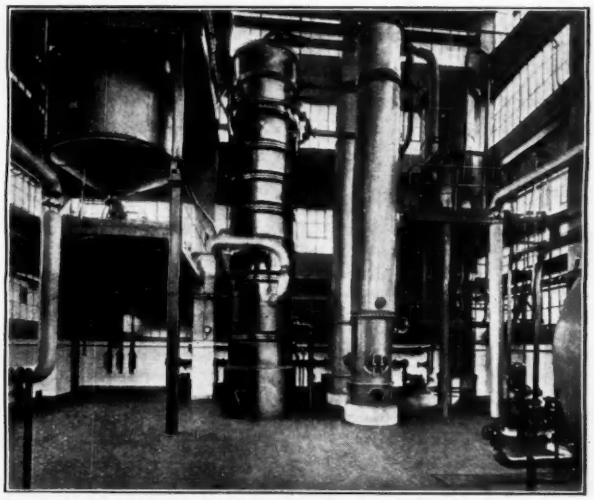
By-Product Building, showing Drier and Sulphate Bagging Hopper with Weighing Machine.



Battery Control Instrument Room, showing Meters and Steam Flow and Pressure Recorders.

in the liquor. The sulphate, after drying in centrifugals, is thoroughly dried and neutralised and discharged into an elevator, feeding into a bagging hopper of 25 cwt. capacity, fitted with an automatic bag filling and weighing machine equipped with a self-registering device. The ammonia still has a capacity of 2,400 gal. of liquor per hour.

The gas is cooled for benzol extraction in a direct hurdle



Benzol Building, showing Wash Oil Still, Vapour to Oil Heat Interchanger, Final Heaters and, in background, Benzol Pumps.

cooler. Three benzol scrubbers are provided, 75 ft. in height. The benzolised oil is distilled in an apparatus of the customary type, as much use as possible being made of the principle of heat interchange. The oil is measured and on its way to the still is heated first by the benzol vapours flowing from the still to the condenser, then by the hot oil leaving the still, and finally by indirect steam. The distillation is completed in the still by live steam. The crude benzol is rectified to produce motor spirit. The crude benzol is first distilled into "benzol" and "heavy naphtha," then washed with B.O.V., soda and water, after which it is again redistilled and the inhibiting material added. The gas after leaving the benzol plant enters a 20,000 c.ft. holder, from which it is distributed to the ovens, the blow-off pipe and the steel plant.

Institute of Chemistry Examinations

A High Standard of Work

THE June issue of the Journal of the Institute of Chemistry announces that 48 candidates sat for the April-May examinations—32 for the Associateship and 16 for the Fellowship—of whom 36 (24 Associates and 12 Fellows) passed. An abstract of the report of the board of examiners states that the general level of the candidates' work in inorganic and physical chemistry was higher than at several recent examinations. Three or four candidates did very well indeed both in the theory papers and in the practical work. The papers appeared to be well within the capabilities of the candidates, since their choice among the alternatives provided covered all the questions set. There was a close correspondence between the merit of the candidates in this part of the examination and in organic chemistry. The practical work was, on the whole, done well, and in very workmanlike manner.

Organic Chemistry

A few outstanding candidates attained a high level in organic chemistry and the majority were of good average ability in their work, both in theoretical and practical organic chemistry. Most candidates seemed to know something about the stereo-chemistry of the oximes, and about the more interesting theoretical problems presented by the subject. Few, however, had a really good grasp of the descriptive side, and there was some ignorance of fundamental reactions. This was shown particularly in attempts to devise synthetical methods, the routes not infrequently selected being impracticable, both from the chemical and the economic points of view. The examiners have frequently pointed out in their reports that teachers do not seem to be successful in impressing upon their pupils the necessity for obvious precautions in making use of so-called general reactions. Again, it is not sufficiently clearly realised that synthetical devices are useless if, at a certain stage, a large number of isomerides are obtainable.

In the practical work the majority of the candidates soon obtained an idea as to the nature of the naphthol-naphthylamine mixture, but many did not effect a satisfactory separation at a sufficiently early stage. Two or three candidates returned almost completely satisfactory solutions of the problem on the conditions for the oxidation of benzil, but with these exceptions, little enterprise was displayed in this exercise. The language tests proved comparatively easy on this occasion, a lack of knowledge of German, however, still affecting a small proportion of the candidates.

Fellowship Papers

In the Fellowship examination in the chemistry (including microscopy) of food and drugs and of water, the answers to a question on the theoretical considerations underlying the application of cryoscopy to the detection of added water in milk were disappointing. Several candidates had very little understanding of the principles involved. With regard to a question on vinegar, the manufacturing process was often described with little reference to the chemistry of the reactions involved. Several of the candidates did not read the question on vitamins carefully. They enumerated the vitamins, and gave a brief account of their physiological functions, but with little reference to the chemical nature of these substances.

The routine practical work was well done, but some weakness was shown in the interpretation of results. Some candidates gave faulty interpretations, based on insufficient evidence, thereby showing their lack of the necessary experience. With one or two exceptions, the candidates had a good knowledge of drugs and therapeutics, and had realised the importance of studying the changes introduced in the 1932 edition of the "British Pharmacopœia."

HAVING insufficient local output of bleaching powder it is necessary for Finland to import the bulk of its requirements for use in the cellulose industry and sanitation. The volume of the annual imports places Finland among the first five largest importers of this chemical. The British share of this trade, which exceeded 5,000 tons in 1929, declined to some 1,400 tons in 1931.

London's Water Supply

New Contract for the Paterson Engineering Co.

THE Metropolitan Water Board is now expending a sum of approximately £100,000 on the extension of its filtering arrangements at the Green Lanes pumping station, Stoke Newington. In this connection it has placed a contract with the Paterson Engineering Co., Ltd., for the installation of the essential mechanical equipment for rapid gravity sand filters of 34,000,000 gal. per 24 hours capacity. This equipment will operate on the very latest principles, comprising 12 large filter units each 30 ft. by 30 ft. effective filtering area, and will include control of the whole of the filter apparatus hydraulically from operating switches mounted on control tables in the centre of the main operating floor of the filter house.

Each filter will be fitted with an outflow regulator in the form of a special Venturi control valve, and in addition there will be included equipment for continuously indicating and recording the loss of head through the sand filters and the rate at which water is passing through each individual filtering unit.

A very large amount of Paterson equipment, particularly rapid gravity sand filters and "Chloronomes" for the continuous sterilisation of water by means of chlorine gas, is operating in various plants of the Metropolitan Water Board, which now takes approximately 58 per cent. of its total water supply from the River Thames, with the remainder from the River Lee, the New River, wells and other sources. The filtered water is treated with a trace of ammonia and is then sterilised by means of the "Chloronome" apparatus.

Four New I.C.I. Dyestuffs

Attractive and Useful Shades

FOUR attractive and useful new shades which have recently been added to the range of dyestuffs made by Imperial Chemical Industries, Ltd. Caledon Brown 2GS and 5GS and Caledon Yellow Brown 3GS are suitable for application to natural silk and viscose artificial silk as well as linen and all types of cotton materials, and all possess the excellent fastness properties usually associated with the Caledon series. Dispersol Fast Brown 4RS is of interest for dyeing all forms of acetate silk, and its rich red-brown shade is of value where good all-round fastness is desired, giving excellent level results on yarns or piece goods.

Caledon Yellow Brown 3GS Paste may be applied to all types of cotton materials either in the open beck or in machines. The fastness to light of this product makes it eminently suitable for the dyeing of cotton materials, etc., whilst its very good fastness to bleaching and chlorine makes it of interest for application to yarns for the shirting trade. Fastness to light and degumming of the shades obtained on natural silk also makes it of interest for the dyeing of this material.

This product is suitable for application to viscose artificial silk and linen, may be printed on cotton, viscose and natural silk using the potash-formosul method and can also be used as ground shades for the production of discharge styles.

Dispersol Fast Brown 4RS patented is an addition to the range of dyestuffs for acetate silk. Its rich, red-brown shade is of value where good all-round fastness is desired and, whether used in combination with other dyestuffs of the same class or dyed as a self shade, it gives excellent level results on yarns or piece goods. Like other Dispersol Fast dyestuffs this product can be used in conjunction with other dyestuffs for application to mixed fabrics containing acetate silk as it is unaffected by acids, alkalies, salt, etc., that may be necessary in the dyebath. It is suitable for direct printing and is eminently suitable for use in discharge printing, as it gives clear white effects when discharged by the Formosul-calcium (or zinc) sulphocyanide process. It possesses very good affinity for the acetate silk fibre and can be dyed without the addition of assistants to the dyebath. The presence of soap or soluble oil assists in penetration and level dyeing, while, as stated above, it is unaffected by the presence of acids, alkalies, salts, etc., in the dyebath, if dyestuffs used in conjunction with it necessitate such additions.

British Celanese Appeal Dismissed

Judgment in Favour of Courtaulds, Ltd.

IN the Court of Appeal, on Monday, the Court, which was composed of the Master of the Rolls, and Lords Justices Lawrence and Romer, delivered their reserved judgment on the appeal by the British Celanese, Ltd., from the dismissal by Mr. Justice Clauson, sitting in the Chancery Division, of its action against Courtaulds, Ltd., alleging infringement of two letters patent for evaporative or dry spinning of cellulose acetate rayon. Mr. Justice Clauson had ordered the two patents to be revoked on the ground of invalidity, but the revocation had been suspended pending the appeal.

Sir Arthur Colefax, K.C., Mr. Craig Henderson, K.C., Mr. Neap, and Mr. Russell Clark appeared for the plaintiffs, and Mr. Whitehead, K.C., Sir Stafford Cripps, K.C., Mr. Trevor Watson, K.C. and Mr. Tookey represented the defendants.

The Master of the Rolls, in giving judgment, said the action was by British Celanese as the registered legal owners of letters patent Nos. 165,519, 182,154, 198,023, and 203,092, and they alleged that Courtaulds had infringed these patents. By their defence defendants denied infringement and set up that the four patents were invalid. Defendants counter-claimed for revocation. The plaintiffs did not rely on patent No. 182,154 and defendants abandoned their claim for its revocation.

History of the Case

As to the three remaining patents, the defendants said there was want of novelty by reason of prior publication, and prior common general knowledge, setting up patents, articles, etc., published prior to the date of the first patent in March, 1920. The defendants further alleged that the patents were bad for want of subject matter, absence of utility and ambiguity.

Mr. Justice Clauson, in dismissing the action, made an order for the three letters patents, holding there was no subject matter and that there had been anticipation and that the claim as framed was a voidable ambiguity.

The plaintiffs abandoned their claim in respect of patent No. 203,092 and Mr. Justice Clauson ordered its revocation. The remaining patents in dispute were Nos. 165,519 and 198,023, the validity of which was challenged and if they were valid then they had been infringed. The main contest was as to the validity of patent 165,519, which was a patent relating to improvements of processes and improvements for the production of rayon filaments. The second patent 198,023 dealt with simultaneous winding of those filament threads by a device of cap spinning.

A Common Birthright

Proceeding, his lordship said, there could not be a patent granted for a monopoly of a natural principle. The laws of nature were the birthright of all, but for a method of utilisation of natural principles and making them applicable to a new manufacture, a grant might be made. Giving full effect to this condition there must not be overlooked the clear rule that the patent must be for a new manufacture. It was not sufficient to take a well-known mechanical contrivance and apply it to a substance to which it had not hitherto been applied. The plaintiffs contended that the specification disclosed downward spinning and said that up to that time there was no appreciation that one could get a useful length of filament by spinning downwards and a sufficient speed in doing this and further that it was not obvious that if they spun downwards they could have outside winding, without an undue and uneconomic loss of spinning speed. In the plaintiffs' specification there was no insistence on speed of spinning or explanation as to how it was to be secured. He could not hold that the statement that the filaments need only travel at relatively short distances, etc., laid emphasis upon the speed. There was no limitation to any particular dope in the Celanese specification. If the claim was for a combination of known integers for totality there must be co-operation between the integers which were brought into combination. There could not be a valid patent for the mere aggregation of integers. His lordship felt the weight of Mr. Whitehead's criticism of the wide nature of the plaintiffs' claim, which covered all derivatives of cellulose and volatile liquid solvents. No particular apparatus was indicated. The temperature and volume of the air for evaporating the solvent, the viscosity of the filament and the length of the casing were all details which were left at large.

Dealing with Clark's specification of 1887, which the defendants relied on, his lordship said it was plain to his mind that Clark contemplated extrusion downwards and the oral evidence confirmed that view. So far as he could judge the difference between plaintiffs' specification and Clark's was that Clark used dry steam and the plaintiffs warm air. The necessity for a disclaimer of Clark appeared to be clear. It was the duty of a patentee to state clearly the nature and limit of what he claimed. If he used language which was obscure or ambiguous the patent was invalid. In his opinion that applied to specification 165,519. He agreed with Mr. Justice Clauson's conclusion on that patent.

Birsch's Process

As to Birsch's process he thought that the defendants had established affirmatively that it disclosed a workable process, as it involved spinning downwards into a shaft-like space and it was an evaporative process. In his lordship's view Birsch must also be treated as an anticipation. The merits of the plaintiffs' invention which were claimed were saving of space, good recovery of the solvent used, the length of and speed at which the filament was produced and reeling outside. Those merits were found in the anticipatory documents except speed, which was no part of the invention claimed. For these reasons in addition to those stated by Mr. Justice Clauson in his judgment, patent 165,579 failed for want of subject matter and by reason of anticipation and it was rightly ordered to be revoked.

Dealing with the second patent, 198,023 for a cap spinning device, his lordship said the claim was for a process in which the filaments were led out in association and continuously cap spun. The plaintiffs suggested that cap spinning was other than an old device in the textile trade and that it was a device which was not of universal application. It was also said that it had been tried for twisting cotton and discarded. Cap spinning was known in 1892 to every textile man and there could be no inventive step in the application of cap spinning to the production of rayon filaments.

Use of Lubrication

For the plaintiffs it was contended that it was not cap spinning simpliciter which was brought into use, but in addition there was a system of lubricating the threads which rendered the twisting more easy and regular and prevented breakages. There was evidence that lubrication was the commonest way of diminishing friction and such a concensus of evidence as to the prevalence and use of lubrication could not be overlooked. It was clear that there was no inventive step in calling in the aid of lubrication. The whole of the system of cap twisting with lubrication facilities was an addition which anyone familiar with the trade would have adopted. In his opinion it was a mere analogous user—a skilled application and a well understood and useful method, with a common and ancillary feature. Therefore he was of opinion that patent 198,023 was bad for want of subject matter. The appeal would be dismissed with costs.

Lord Justice Lawrence concurred, and said he had carefully considered the judgment of Mr. Justice Clauson and in his view he had arrived at a right conclusion. The main complaint against the judgment in the Court below was that the Judge had not considered the process as a whole and as a combination of the elements of which it was said to be composed, but that he had dissected it and having arrived at the conclusion that each element when considered separately in the light of common general knowledge had found that it did not call for the exercise of inventive faculty and that he failed to give due weight to the process which in its totality had never been used before with commercial success. In his view there was no inventive step in winding outside the casing and no novelty in downward spinning or in the use of cellulose

acetate solution as the raw material. In view of the amount of public knowledge of the art in 1920 there was an extraordinary lack of subject matter in the process described in claim one. There was also no inventive step in using the well-known twisting device of cap spinning. The utmost the plaintiffs could claim to be shown was a good process for dope, consisting of cellulose acetate and then only when vital details of manufacture were added, without which the process would be commercially useless.

Lord Justice Romer agreed and the appeal was dismissed with costs.

The Bleachers' Association

Importance of Price Control

PRESIDING at the thirty-fourth annual meeting of the Bleachers' Association, Ltd., at Manchester, on June 23, Sir Alan Sykes, chairman of directors, after referring to a decline in profits during the past year, said the effects of unrestricted competition were well known and now almost universally condemned. Intensive price-cutting in the endeavour to secure a larger share of a diminishing demand led to the elimination of all profit, the entire loss of remuneration for capital, inability to meet overhead charges, a lower standard of living for employees, and, finally, the destruction of capital itself and the permanent loss of employment for a large number of those engaged in the trade. Ample evidence of these tendencies was to be found in certain sections of the cotton trade. Hitherto the bleaching trade had shown sufficient common sense to avoid this self-destructive and, from the national point of view, this useless process.

Controlled production, on the other hand, in its more advanced form permitted the orderly adjustment of productive capacity to demand, with a fair apportionment of the cost of such adjustment as between one producer and another and as between capital and labour. Control of this characteristic had already been applied in one form or another to various industries and was contemplated for others. The simplest form of control was by agreement to maintain the price of a product at a level which would afford a reasonable, but not excessive, remuneration to the various factors of production. The absence of monopoly was a safeguard against the abuse of such arrangements, and the stability of prices under such conditions was a definite advantage to customers, especially in an industry mainly concerned with export trade.

It was on these lines that the bleaching trade had been, and still was, organised. Their methods sometimes had been criticised, and at other times had been cited as an example of what should be done to preserve a trade in the conditions in which they had been placed. Criticism or commendation apart, they were confident that they had been working on the right lines. But the continued depression in trade appeared to be straining their voluntary organisation, and there was some danger of the bleaching trade following the suicidal path which had been marked out by other sections of the cotton industry. As an Association, they had tried loyally to maintain the organisation of the trade, but, if forced to adopt other methods, they would not hesitate to take such steps as might be necessary to preserve their position in the trade.

Chemical Matters in Parliament

Conveyance of Inflammable Oils

IN the House of Commons on June 21, Mr. W. Mabane (Huddersfield) asked the Home Secretary whether, in view of the grave risks to public safety when a motor-lorry carrying inflammable oil was in collision, he could say what special precautions were taken for the conveyance of inflammable oils by road.

Mr. Douglas Hacking (Under Home Secretary) replied that regulations, a copy of which he was sending to Mr. Mabane, were in force under the Petroleum (Consolidation) Act, 1928, governing the conveyance of petroleum spirit by road. These regulations laid down a number of requirements designed to minimise the risks from fire or other accident during such conveyance. It had not, so far, been found necessary to apply the provisions of the Petroleum Act to other kinds of inflammable oils.

The John Benn Hostel

Speeches at the Annual Banquet

THE annual banquet of the East End Hostels Association, which governs the John Benn Hostel, was held at Stationers' Hall, on June 22, and was attended by a distinguished company. Lord Allenby, who presided, was supported by Mr. Hugh Lyon (Headmaster of Rugby), Lord Plender, Mr. J. B. Priestly, Sir John Reith, the Rt. Hon. Wedgwood Benn, and Sir Ernest Benn (president of East End Hostels Association). There were nearly 200 guests present.

Mr. Hugh Lyon, replying to the toast of "The London Boy," proposed by Mr. J. B. Priestley, said the modern boy was frank, courageous and honourable. His laughter was not the crackling of thorns, but was the spark struck from the true metal, and his powers were not those of weakness but strength and compassion. The John Benn Hostel was teaching the boys to look after themselves and do something for themselves. It was sowing the seeds of independence and self respect, which would make the London boy a noble man.

Lord Allenby, in proposing "The John Benn Hostel and the Milner Hall," said the Hostel was doing something worth while, and was doing it well. Its value lay in the fact that it started the boys in the right direction and encouraged them to go on relying on themselves. The Hostel was a national asset of incalculable value; it was a training for the duties of citizenship which would be of value to the future of the country and Empire.

Lord Plender and Sir John Reith supported the toast.

Sir Ernest Benn, in responding, said when the Hostel was begun, they did fairly well. After two years the subscription list reached over £2,000 and they had estimated by now it would be £10,000, but that had not materialised. They commenced the work with a great start from the Prince of Wales, but there was a mountain of debt. Last year they just scraped through, but this year there was a grave risk of debt. There was a good deal of pessimism about, but the aim must be to remove this.

Mr. Wedgwood Benn proposed the health of the chairman and Lord Allenby responded.

At the conclusion of the banquet it was announced that a total of £732 had been raised that night for the Hostel funds.

The Distillers Company, Ltd.

Dividend Maintained at 17½ per cent.

NO change is to be made in the rate of distribution on the £10,690,962 of ordinary share capital of the Distillers' Company, Ltd., the directors having declared a final payment for the year ended May 15 last of 10 per cent., making 17½ per cent. for the year. The allocation to reserve is also maintained at £250,000, but the balance to be carried forward is about £28,000 lower at £263,421. With the addition now made, the reserve fund amounts to £3,000,000, while there is also a dividend equalisation reserve amounting to £250,000.

The company had to report a fairly sharp fall in earnings for the preceding year, the net total amounting to £1,758,869, compared with £2,272,915 for 1930-31. The dividend was reduced by 2½ per cent., and the appropriations to reserve funds were cut by 50 per cent. The preliminary statement of results for the past year indicates that earnings have again declined, although the movement is comparatively trifling. net profit amounts to £1,722,478, which is less than £36,400 below the previous year's total. The whole of the remaining debenture debt of John Walker and Sons, Ltd., was repaid towards the end of 1932, while in May the 4½ per cent. debenture stock of the Distillers' Company, amounting to £450,000, also was repaid The former operation was financed by the parent company, which was thus provided with an excellent investment for a part of its surplus funds.

From 1926 until 1931 a total payment of 20 per cent. was made in each year to the ordinary shareholders.

THE new book, "Patents Explained," by Herbert J. W. Wildbore, of 101 Leadenhall Street, London, published at 5s. net, which was reviewed in THE CHEMICAL AGE of June 10, may also be obtained in pamphlet form, price 8d., post free.

News from the Allied Industries

Rubber

THE Dutch Committee, consisting of MM. Bolderhey, Van Leeuwen Boomkamp, Kasteleyn and Enthoven, has discussed the situation in connection with the restriction of rubber production and is consulting the Dutch Government concerning execution of plans. It is thought in Amsterdam that there is a good possibility of realising the restriction of rubber production.

Foodstuffs

FOLLOWING a report of a certain cocoa and chocolate shortage as the result of a disease known as "witch broom" in the cacao plantations of Dutch Guiana, Ecuador, and Trinidad, the following statement was made on June 26 by Mr. W. A. Knapp, chief chemist of Cadbury Bros., Ltd.: "Only a small proportion of trees have been affected, and in any case these countries supply relatively a small percentage of Great Britain's requirements. More than half the world's cocoa comes from West Africa, where witch broom has never been known."

Iron and Steel

PROPOSALS for the modification of stockholders' rights were approved at an extraordinary general meeting of the Consett Iron Company, Ltd., on June 22. As a result of the decisions of the meeting reduced rates of interest payments will begin to-day (July 1). The interest on the 6 per cent. debentures will be reduced to 4 per cent. per annum, but the residuary 2 per cent. will be carried forward and paid out of any profits of the company for the financial year ending in March, 1937, or in any following year. In the meantime no dividend will be distributed on any class of the company's share capital as long as the postponed debenture interest remains unpaid. The company is precluded from exercising the right of redeeming the debenture stock until July, 1942, at the earliest, and later if the postponed interest is still unpaid.

Paint and Varnish

THE conference of the National Federation of Associated Paint, Colour and Varnish Manufacturers of the United Kingdom, held at Brighton last week, decided to spend a sum running into many thousands of pounds on a national co-operative advertising campaign. The conference agreed to make further strong efforts to obtain the abolition of the import duty on certain important raw materials. It was pointed out that Great Britain was one of the greatest paint and varnish countries in the world, yet an import duty ranging from 10 per cent. to 20 per cent. on raw materials was demanded. The indecision of the Import Duties Advisory Committee was detrimental to manufacturers in catering for the export market. The conference decided to protest to the Board of Trade against under-cutting by Japan. In India especially the menace was becoming very serious.

Non-Ferrous Metals

THE first step taken in the development programme of the Tin Research and Development Council, which has been organised by the International Tin Committee, has been to secure the co-operation of tin shareholders throughout the world in the selling of goods containing their tin. Mr. Macnaughtan, who has been appointed Director of Research, has begun investigations into all the most pressing problems concerning the industrial applications of tin. Co-operating with his research organisation in London are other scientists in universities and industrial laboratories through England, the United States and Germany. In the United States a special "U.S. Tin Research and Development Committee" has been set up by the American Tin Trade Association to work in close co-operation with the International Tin Research and Development Council. It is hoped that the canning, tinplate, motor car, bearing metal, and the many other industries which consume tin will make use of the research facilities now made available by the council for the elucidation of any problems that arise concerning the use of tin. The development side of the council's programme is under direction of Colonel S. Heckstall-Smith, an authority on international marketing problems.

Textiles

MR. J. H. LOCKWOOD, M.P. for the Shipley Division, who is at the head of several textile firms in the West Riding, referred to the improvement in that branch of the industry when speaking at Menston on June 24. "The textile trade is doing very well indeed," said Mr. Lockwood. "Speaking from personal experience, I know there is difficulty in filling the vacancies, particularly for women and girls, in the spinning and weaving departments. I think there is a tendency for more continuous employment, and for more settled times generally in the textile industry. There is a difficulty in getting men for the higher posts who have the qualifications. The vacancies are there, but there is a lack of people who have really 'bottomed it,' as we say in Yorkshire."

Laundry

MR. W. CRABTREE, of Blackburn, president of the National Federation of Launderers, speaking at the annual congress of the Federation, which opened at Llandudno on June 24, said the industry as a whole was in a satisfactory condition, bearing in mind the general depression. It had weathered the storm better than most and was doing better work at comparatively cheaper prices than at any previous time. The health of the community depended on cleanliness, and members of the Federation were doing their part in promoting that. The housewife who washed at home was still their greatest competitor, but when they had completed their costing system they hoped to be able to convince her that it was more economical and hygienic to make use of an up-to-date laundry.

China Clay

PRESIDING at the fourteenth annual meeting of English China Clays, Ltd., in London, on June 27, Mr. R. Martin, chairman and managing director, said the assets which were to be transferred to English Clays Lovering Pochin and Co., Ltd., under the amalgamation scheme, had been brought together under the one heading in the balance sheet and totalled £1,768,773. The capital of the amalgamated company would be a little over £2,500,000. The new undertaking would operate 57 pits and mica works, 11 china stone quarries, seven ground stone mills, four brick works, two ball clay works and 528 main line trucks. It had stores at Fleetwood, Preston, Runcorn, Leith, Bruges, La Pallice and South Haven, and branch offices in London, Manchester, Stoke, Edinburgh, New York, and Brussels, besides agencies in almost every country.

REPRESENTATIVES of the china clay industry visited the Greensplat china clay works last week and were entertained to luncheon by Mr. R. J. Varcoe. Since his acquisition of the Greensplat works, Mr. Varcoe has been working on an idea to improve the drying process, and he has recently evolved a new drying floor which has been put into operation at the Trenance siding, near St. Austell. In his pursuits, Mr. Varcoe found that heat is not the main factor in drying clay, but contact and conduction. Having solved the problems concerning the action of steam on the new process, Mr. Varcoe applied himself to the best way of securing contact and conduction, and found that brass triangular tubing was the most suitable. The tubing is laid lengthwise on the whole floor 100 ft. by 20 ft. on a bed of cinders faced with sand and between each tube there is a layer of clay so that in practice, the flat top of the tubes and the clay form the drying floor, thus securing contact with conduction to the clay instead of heat. The steam through the whole range of tubing is evenly distributed and over 30 tons of clay can be dried by this new method compared with 7 tons under the old. As a proof of Mr. Varcoe's confidence in his new system he has recently purchased the Boldelva and the Hensbarrow china clay works, which were in liquidation. In the former he is installing the new drying system, and at Hensbarrow he is converting the old method to the new. Mr. Varcoe claims that the new drying floor will effect a considerable saving in coal. He expected to use about 150 lb. pressure, but he found that a steam pressure of 20 lb. dried much more efficiently than higher pressure.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THE following market report is based on information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

THE demand continues quite satisfactorily in the London chemical market and prices on the whole are firm. Buyers are still showing more interest in forward delivery. There is no change to report in the coal tar products market from last week. The tone of the Manchester chemical market is fairly cheerful but actual business is slow to expand and new buying during the past week has been only on moderate lines. In some instances textile bleaching and dyeing establishments are somewhat better situated and deliveries of chemicals against contract commitments are on a fair scale. The Lancashire industrial holiday season starts this week-end, however, and over the next eight or ten weeks this must be expected to have a seasonally quietening influence. Values, generally, have been steady to firm again this week. Buying continues fairly steady in the Scottish heavy chemical market. Prices generally remain unchanged.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 9½d. per lb.; less 5%. MANCHESTER: 9½d.

ACID, CRESYLIC.—97/99%, 1s. 1d. to 1s. 7d. per gal.; 98/100%, 1s. 5d. to 2s.

ACID, FORMIC.—LONDON: £47 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 7s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £48 to £52 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 11½d. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 11¾d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON. £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £32 per ton; powdered, £34, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £24 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £19 c.i.f. main U.K. ports for imported material; Cornish nominal, £23 f.o.r mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £23 at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—2s. 10d. to 3s. 2d.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3½d. to 5d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. per lb. Liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £4 per cwt.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £36; brown, £1 per ton less. MANCHESTER: White, £31 10s.; brown, £29.

LEAD NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £24 to £26 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. per gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—9d. to 10d. per lb. nominal.

POTASH, CAUSTIC.—LONDON: £42; MANCHESTER: £41.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¼d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¼d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8¼d. B.P., 8¾d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 5s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 15s. in casks, Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.

SODIUM CHROMATE.—3⅜d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.
SODIUM NITRATE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£12 10s. per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station, returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £17 per ton f.o.b.
SULPHUR.—£11 15s. per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 4d. to 4s. 6d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON AND SCOTLAND: £12 per ton.
ZINC SULPHIDE.—11d. to 1s. per lb.

Pharmaceutical and Fine Chemicals

ACID, CITRIC.—9¼d. per lb.
ACID, TARTARIC.—11¾d. per lb., less 5%.
CADMIUM IODIDE.—14s. 6d. per lb.
IRON AMMON. CITRATE.—B.P., 1s. 9d. per lb.; green, 2s. 5d. per lb.
IRON QUININE CITRATE.—9¾d. to 1s. 0½d. per oz.
LINALOL (ex Shui oil).—5s. 9d. per lb.
MENTHOL.—A.B.R. recryst., B.P., 15s. per lb.; synthetic detached crystals, 8s. 6d. to 10s. 6d. per lb.
PHENACETIN.—4s. to 4s. 6d. per lb.
POTASSIUM BITARTRATE, 99/100% (Cream of tartar).—£4 per cwt.
POTASSIUM CITRATE.—B.P., 1s. 7d. per lb.
SODIUM BARBITONUM.—13s. to 15s. per lb.
SODIUM CITRATE.—B.P.C., 1911, 1s. 4d. per lb.; B.P.C., 1932, and U.S.P., 1s. 8d. per lb.
SODIUM POTASSIUM TARTRATE (Rochelle sale).—£3 10s. per cwt.
TARTAR EMETIC, B.P.—3s. 9d. to 4s. 6d. per lb.

Essential Oils

ALMOND, FOREIGN, S.P.A.—9s. per lb.
BERGAMOT.—6s. 6d. per lb.
BOURBON GERANIUM.—25s. 3d. per lb.
LAVENDER, MONT BLANC, 38/40%.—10s. per lb.
LEMONGRASS.—3s. per lb.
PEPPERMINT, JAPANESE.—6s. 6d. per lb.
SANDALWOOD, AUSTRALIAN, B.P. and French Codex, 92/95%, 15s. 6d. per lb.

Intermediates and Dyes

IN the following list of intermediates delivered prices include packages except where otherwise stated:—
ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
p-CRESOL 34-5° C.—1s. 9d. per lb. in ton lots.
m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
DICHLORANILINE.—2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROTOLUENE.—48/50° C., 8d. per lb.; 66/68° C. 8¾d. per lb.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 15s. in casks, in 1-ton lots.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 4d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 9d. to 10d. per lb.; crude, 60's, 2s. 5d. to 2s. 6d. per gal.; 2% water 3s. 0¾d. MANCHESTER: Crystals, 9½d. per lb.; crude, 2s. 7d. per gal. SCOTLAND: 60's, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100%, 11d. to 1s. 8d. per gal.; pale 95%, 11d. to 11½d.; dark, 10d., all according to specification; refined, 1s. 7d. to 1s. 8d. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
ANTHRACENE OIL.—Strained, 4½d. per gal.
BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor 1s. 4d. to 1s. 4½d.; 90%, 1s. 5d. to 1s. 6d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 7½d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.
CREOSOTE.—B.S.I. Specification standard, 3d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3d. to 3¼d. f.o.r. North; 4d. to 4¼d. London. MANCHESTER: 2d. to 3½d. SCOTLAND: Specification oils, 3½d. to 4d.; washed oil, 3½d. to 4d.; light, 3d. to 3½d.; heavy, 4½d. to 5d.
NAPHTHA.—Solvent, 90/160%, 1s. 4d. to 1s. 5d. per gal.; 95/160%, 1s. 7d.; 90/190%, 9d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaked, £10 per ton. Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 65s. to 70s.
PITCH.—Medium soft, £4 per ton. MANCHESTER: £3 15s. f.o.b. LONDON: £4 to £4 2s. 6d. f.o.b. East Coast part.
PYRIDINE.—90/140, 4s. to 4s. 6d. per gal.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160% 4s. to 5s.; 90/220%, 3s. to 4s.
REFINED COAL TAR.—SCOTLAND: 4d. per gal.
XYLOL.—Common, 1s. 11d. to 2s. per gal.; pure, 2s. 2d. to 2s. 3d.
TOLUOL.—90%, 2s. to 2s. 1d. per gal.; pure, 2s. 4d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 15s. to £9 per ton. Grey £14 to £15. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £9 10s.; grey, £16.
ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£6 to £11 per ton.
WOOD CREOSOTE.—6d. to 2s. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 7d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR.—£2 to £6 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Export, £6 per ton f.o.b. U.K. ports in single bags; home, £6 10s. per ton, delivered in 6-ton lots to consumer's nearest station.
NITRATE OF SODA.—£8 16s. per ton, delivered in 6-ton lots to consumer's nearest station.
CYANAMIDE.—£7 per ton, delivered in 6-ton lots to consumer's nearest station.
NITRO-CHALK.—£7 5s. per ton, delivered in 6-ton lots to consumer's nearest station.
CONCENTRATED COMPLETE FERTILISERS.—£10 9s. 6d. to £11 per ton according to percentage of constituents.

Latest Oil Prices

LONDON, June 28.—LINSEED OIL was easier. Spot, small quantities, £23 15s. per ton; July, £20 12s. 6d.; July-Aug., £20 12s. 6d.; Sept.-Dec., £21, naked. RAPE OIL was quiet. Crude, extracted, £29 per ton; technical refined, £30 10s., naked, ex wharf. COTTON OIL was steady. Egyptian crude, £21 per ton; refined common edible, £23 10s.; and deodorised, £25 10s., naked, ex mill. TURPENTINE lower. American, spot, 53s. 6d. per cwt.
HULL.—LINSEED OIL had an easier tendency; spot, quoted £21 7s. 6d.; June, £20 15s.; July-Aug., £21; Sept.-Dec., £21 2s. 6d.; Jan.-April, £21 12s. 6d. COTTON OIL, Egyptian crude, spot, £21 5s.; edible, refined, spot, £23 5s.; technical, spot, £23 5s.; deodorised, £25 5s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £20, naked. GROUNDNUT OIL, extracted, spot, £25; deodorised, £29. RAPE OIL, extracted, spot, £27 10s.; refined, £29. SOYA OIL, extracted, spot, £22; deodorised, £25 per ton. COD OIL, Sept., 19s. per cwt. CASTOR OIL, pharmaceutical, spot, 39s.; firsts, 34s.; seconds, 31s. per cwt. TURPENTINE, American, spot, 55s. 6d. per cwt.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Aliphatic Acid Anhydrides

ALIPHATIC anhydrides are produced by heating salts of the corresponding acids such as acetates of metals of high or relatively high basicity such as the alkaline-earth metals, iron, lead, manganese, aluminium, and zinc, the acetates of which normally yield substantial quantities of acetone on heating, these salts being heated in admixture with normal salts of strong mineral acids, such as the sulphates of chlorides of the metal present in the acetate. The salts are preferably used in the anhydrous form. The acetates are preferably dried at temperatures not exceeding 200° C., the added salt being dried separately if it requires a higher temperature. For the decomposition, the acetate admixed with the added salt may be simply heated, or heated in a current of air, nitrogen, carbon dioxide or other indifferent gas, or in a current of indifferent vapour such as benzene or petroleum ether. The temperature range is about 200-450° C. In an example, crystals of manganous acetate are dried at 120° C., mixed with anhydrous manganous chloride, and heated at 280-300° C. at an absolute pressure of 10-20 mm. The crude anhydride may be fractionally distilled. (See Specification No. 382,673 of H. Dreyfus.)

Specifications Accepted with Dates of Application

CATALYSTS, MORE PARTICULARLY FOR USE IN THE CONVERSION OF HYDROCARBONS TO LIGHTER HYDROCARBONS.—United Kingdom Oil Co., Ltd., and G. F. Forwood. Sept. 15, 1931. 393,664.

MANUFACTURE OF CYCLIC DIETHERS.—H. Dreyfus. Nov. 30, 1931. 393,608.

FLUID COMPOSITIONS FOR FLUID PRESSURE SYSTEMS.—H. Langwell, J. E. Youell, and British Industrial Solvents, Ltd. Dec. 4, 1931. 393,591.

PROCESS FOR CONVERTING SUBSTANTIALLY UNCRACKED PETROLEUM, SHALE OIL, OR THE LIKE, INTO AN OILY MENSTRUUM FOR MAKING RUBBERY PRODUCTS.—J. T. Giron. Dec. 5, 1931. 393,600.

RETORTS FOR DISTILLATION TREATMENT OF MATERIALS CONTAINING HYDROCARBONS.—E. W. Brocklebank and W. B. Mitford. Dec. 5, 1931. 393,601.

PROCESS FOR DISTILLATION TREATMENT OF MATERIALS CONTAINING HYDROCARBONS.—E. W. Brocklebank and W. B. Mitford. Dec. 5, 1931. 393,602.

PLASTICISERS FOR CELLULOSE DERIVATIVES AND THEIR APPLICATION.—E. I. Du Pont de Nemours and Co. Dec. 6, 1930. 393,619.

PROCESS FOR THE MANUFACTURE OF CONDENSATION PRODUCTS OF THE ANTHRAQUINONE SERIES.—A. Carpmael (I. G. Farbenindustrie). Dec. 9, 1931. 393,631-2.

PROCESS FOR THE MANUFACTURE OF PURE CARBON IN A VERY FINELY DIVIDED STATE.—G. Antonoff and J. Freedland. Sept. 26, 1932. 393,677.

RECOVERY OF AMMONIA FROM COAL GAS AND LIKE GASES.—Institution of Gas Engineers and A. Key. Dec. 24, 1931. 393,678.

MANUFACTURE AND PRODUCTION OF ACETALDEHYDE FROM ACETYLENE.—J. Y. Johnson (I. G. Farbenindustrie). Jan. 20, 1932. 393,690.

PROCESS FOR THE PREPARATION OF MIXED ETHERS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. June 29, 1931. 393,753.

PROCESS OF EXTRACTING CADMIUM FROM ITS OXY COMPOUNDS.—A. H. Stevens (American Smelting and Refining Co.). June 29, 1932. 393,764.

LIQUIDS OR PLASTIC PREPARATIONS FOR THE TREATMENT OF FIBROUS MATERIALS.—H. T. Böhme Akt.-Ges. Aug. 6, 1931. 393,769.

MANUFACTURE OF DYESTUFFS CONTAINING CHROMIUM.—Soc. of Chemical Industry in Basle. Sept. 29, 1931. 393,785.

PRODUCTION OF PHOSPHORUS.—Panstwowa Fabryka Zwiazkow Azotowych W. Chorzowie. Sept. 28, 1931. 393,799.

PRODUCTION OF BLEACHING CLAYS.—Bayersiche Akt.-Ges. für Chemische und Landwirt-Schaftlish-Chemische Fabrikate. Sept. 3, 1931. 393,807.

PROCESS FOR THE MANUFACTURE OF DRY DIAZO PREPARATIONS.—Soc. of Chemical Industry in Basle. Oct. 17, 1931. 393,830.

MAGNESIUM ALLOYS.—C. Arnold (Dow Chemical Co.). Oct. 24, 1932. 393,837.

AQUEOUS EMULSIONS OF BODIES INSOLUBLE OR DIFFICULTLY SOLUBLE IN WATER.—C. G. Fox and S. Stockell. Nov. 19, 1932. 393,868.

MANUFACTURE OF AZO DYESTUFFS.—Soc. of Chemical Industry in Basle. Dec. 21, 1931. 393,873.

PURIFICATION OF VITAMIN-A PREPARATIONS.—F. Hoffmann-La Roche and Co. Akt.-Ges. Jan. 13, 1932. 393,883.

PROCESS FOR MANUFACTURING ARTIFICIAL STRUCTURES FROM CUPRAMMONIUM-CELLULOSE SOLUTIONS.—W. W. Triggs (J. P. Bemberg Akt.-Ges.). Jan. 13, 1933. 393,890.

PROCESS OF MANUFACTURING ALUMINIUM, AND BARIUM, OR STRONTIUM COMPOUNDS.—Coframet Soc. Anon. Jan. 22, 1932. 393,896.

MANUFACTURE OF CELLULOSE DERIVATIVES.—Soc. of Chemical Industry in Basle. March 4, 1932. 393,914.

Complete Specifications Open to Public Inspection

MANUFACTURE OF ARSENO-COMPOUNDS.—I. G. Farbenindustrie. Dec. 12, 1931. 30763/32.

PROCESS FOR THE PRODUCTION OF LACTIC ACID AND ITS SALTS.—Bamag-Meguin Akt.-Ges. Dec. 7, 1931. 31641/32.

MIXED ESTERS.—Carbide and Carbon Chemicals Corporation. Dec. 10, 1931. 33136/32.

DYEING ANIMAL FIBRES WITH METAL COMPLEX COMPOUNDS OF ORGANIC ACID DYESTUFFS.—I. G. Farbenindustrie. Dec. 7, 1931. 34678/32.

MANUFACTURE OF DIHYDOXY-FLUORANTHENE AND THE DIAKYL ETHERS THEREOF.—I. G. Farbenindustrie. Dec. 11, 1931. 35000/32.

Applications for Patents

PRODUCTION OF STARCH, ETC.—W. J. Bellingham. June 15. (New Zealand, Dec. 8, '32.) 17143.

PRODUCTION OF BENZOIC ACID AND BENZOATES.—Bozel-Malétra Soc. Industrielle de Produits Chimiques. June 13. (Germany, Nov. 8, '32.) 16867.

TREATING HYDROCARBONS.—Brassert-Tidewater Development Corporation. June 13. (United States, June 24, '32.) 16850.

UREA FORMALDEHYDE CONDENSATION PRODUCTS.—H. I. Bull and Imperial Chemical Industries, Ltd. June 15. 17146.

FERTILISERS.—P. Christian. June 12. (Germany, June 11, '32.) 16731.

COMPOUNDED LATEX.—R. B. F. F. Clarke and Imperial Chemical Industries, Ltd. June 15. 17147.

PRODUCTION OF VOLATILE METALS.—H. E. Coley. June 12. 16740.

TREATMENT OF ORGANIC SUBSTANCES.—H. Dreyfus. June 12. 16685.

MANUFACTURE OF DYESTUFF INTERMEDIATES.—E. I. Du Pont de Nemours and Co. June 12. (United States, June 11, '32. 16801, 16802, 16803.

MANUFACTURE OF COMPLEX SALTS.—E. I. Du Pont de Nemours and Co. June 13. (United States, June 17, '32.) 16858.

THERAPEUTIC AGENTS.—E. H. Eising. June 16. (United States, Sept. 13, '32.) 17243.

PRODUCTION AND EMPLOYMENT OF ORGANIC PERSULPHO COMPOUNDS.—Flesch-Werke. June 17. (Nov. 27, '31.) 17310.

MANUFACTURE OF DERIVATIVES OF DI- OR TRIMETHOXY AND ETHOXY-BENZOIC ACIDS.—H. J. W. France (Hoffmann-La Roche and Co. Akt.-Ges.). June 16. 17229.

PRODUCTION OF WATER-SOLUBLE COMPOUNDS OF TUNGSTEN, ETC.—M. G. Freise and Metallges. June 14. 16952.

PREPARING LUBRICATING, ETC., OIL FROM WASTE OILS.—C. van Grondelle. June 12. 16779.

TREATMENT OF CLAYS.—W. W. Groves (Merrimac Chemical Co.). June 15. (June 23, '32.) 17099.

EXTRACTION OR PURIFICATION OF SODIUM CHLORIDE.—R. Hara. June 14. 17029.

MANUFACTURE OF DISAZO-DYESTUFFS.—I. G. Farbenindustrie. June 12. (Germany, June 11, '32.) 16768.

DEVELOPING FABRICS PRINTED WITH VAT DYESTUFFS.—I. G. Farbenindustrie. June 12. (Germany, June 11, '32.) 16769.

MANUFACTURE OF THIOUREA COMPOUNDS.—I. G. Farbenindustrie. June 12. (Germany, June 13, '32.) 16770.

MANUFACTURE OF VAT DYESTUFFS.—I. G. Farbenindustrie. June 14. (Germany, June 14, '32.) 16975.

PRODUCTION OF VALUABLE HYDROCARBONS.—International Hydrogenation Patents Co. June 17. 17293, 17294.

PRODUCTION OF POTASSIUM OXALATE.—Koepp and Co. Chemische Fabrik. June 14. 17016, 17017.

MANUFACTURE OF VAT DYESTUFFS.—R. J. Loveluck, Imperial Chemical Industries, Ltd., and A. C. Marshall June 14. 17023.

CHEMICAL MANUFACTURE.—Mathieson Alkali Works. June 15. 17157, 17158.

MANUFACTURE OF ARTIFICIAL SILK.—North British Rayon, Ltd., A. V. Pitter and E. Walls. June 13. 16900.

MANUFACTURE OF INDIGOID DYESTUFFS.—Soc. of Chemical Industry in Basle. June 14. (Switzerland, June 23, '32.) 16973.

PRODUCTION OF HIGHLY ACETYLATED CELLULOSE ACETATES.—A. H. Stevens (Berl). June 13. 16906.

From Week to Week

MAJOR E. SEABORN MARKS, managing director of the Nigerian Electricity Supply Corporation, Ltd., and Mr. James Aitken have joined the board of the Nor-Russ Liquid Lead Co., Ltd.

FOUR MEN WERE INJURED in a mishap at Wrexham gasworks on June 22. The four men were working in the governor house when, it is believed, gas escaping at a main became ignited.

SIXTY GLASSWORKERS have gone on strike at Sowerbys, Gateshead, owing to the removal of an official. They declare that they are prepared to carry on the strike until the official is restored.

THE HOME SECRETARY has formally certified as dangerous the manufacture, use and storage of cellulose solutions, and has issued regulations in draft aiming at the prevention of fire and protection of the health of workers.

SIR FREDERICK KEEBLE, controller of agricultural research to Imperial Chemical Industries, Ltd., has received a great welcome at Buenos Aires since his arrival, and on Wednesday he delivered a lecture to the University Faculty of Science.

MR. F. K. THORNTON, science lecturer at Wellingborough School, was demonstrating an experiment in the chemical laboratory at the school on June 22, when a flask containing concentrated sulphuric acid burst. Mr. Thornton received burns on the neck and back, but is progressing satisfactorily.

TWO THOUSAND EMPLOYEES of the North British Rubber Co. at Edinburgh have gone on strike as a protest against an output bonus system which is being instituted by the management. The management have decided to close down the entire works until further notice. It is understood, however, that negotiations are in progress which may bring about an early settlement.

THE LARGEST PALESTINE SOAP FACTORY, the Sheman Works, Ltd., at Haifa, is endeavouring to improve and diversify its production to meet the demands of the local and adjacent Near East markets. Soap flakes and shaving soaps have been added as new lines and several better grades of toilet soap are being made. The production of oil paints, varnishes, and linseed oil has also been undertaken.

AN EXPLOSION OF COAL DUST at the works of the Sheffield Smelting Co., Ltd., Royds Mill Street, caused an outbreak of fire in which an employee, Henry Ullyatt, of Sheffield, was badly burned on the arms and face. Despite his injuries, Ullyatt attacked the blaze with a fire extinguisher after giving the alarm. The fire brigade quickly prevented the fire spreading.

A SUBSIDIARY COMPANY of Imperial Chemical Industries, Ltd., British Titan Industries, Ltd., is to establish a factory on a seven acre site between Haverton Hill-on-Tees and Stockton-on Tees for the manufacture of paint. Reservation is being made for the acquisition of further land for future extension. It is proposed to lay direct pipe lines between the Imperial Chemical Industries factory at Billingham and the proposed new factory for the supply of sulphuric acid.

OSAKA AND DAIREN FINANCIERS plan the construction of a paint factory at Mukden, Manchuria, with a capital of £63,800. The new plant will be erected in the new industrial district of Mukden and it is proposed to start construction sometime this year. Present domestic market requirements for paints and varnishes are furnished by imports and products manufactured by a Japanese firm, the Manchurian Paint Co., with a factory located in Dairen. According to the report this firm will be one of the shareholders in the new project, but will continue the operation of its Dairen plant.

THE ENGAGEMENT IS ANNOUNCED of Mr. Charles F. Ratcliffe Brotherton, of Kirkham Abbey, and Miss Ethel Isabel Worsley, of Hovingham Hall, Malton. Mr. Ratcliff Brotherton is chairman of Brotherton and Co., Ltd., the ammonia and tar distilling firm, and he has for many years been identified with the life of Leeds, being, amongst other things, a member of the Council of the University. He is a nephew of the late Lord Brotherton, of Wakefield, and assumed the surname of Brotherton in lieu of Ratcliffe by deed poll two years ago. Miss Worsley is the second daughter of Sir William Worsley, and she has achieved prominence in the field of sport, being Northern golf champion.

MR. C. EDWARD WILLIAMS, of Cardiff, was elected president of the Institute of British Foundrymen at the annual conference at Cardiff on June 21. In his presidential address, Mr. Williams said the foundryman could claim his share in the progress of the world since the age of feudalism, for he made the cannon to enable gunpowder to do its job. The foundryman was pushing open the door of a new age—the aluminium age. At present cast iron was used for a thousand useful purposes. The tonnage of iron used in the world was a measure of the world's progress, but the high-water mark seemed to have been reached in 1929 when 120,000,000 tons of cast iron and steel poured out of the world's furnaces.

A DONATION OF 100 GUINEAS has been received by the National Federation of Young Farmers' Clubs from Imperial Chemical Industries, Ltd., in response to its recent appeal.

MR. W. THORP, manager of Bryant and May's factory at Maryhill, retired last week. He and Mrs. Thorp were the recipients of gifts from the staff at a social gathering.

MR. H. C. MERRETT, of 32 Finsbury Square, London, E.C.2, was appointed receiver and manager of Adley Tolkein and Co., Ltd., on June 16, under powers contained in debentures dated October 12, 1932.

LOCAL PRODUCTION OF ANHYDROUS AMMONIA may soon be developed in China if the Government-sponsored ammonium sulphate plants under consideration for Shanghai and Canton are built.

SIR RICHARD GREGORY has been elected to a Fellowship of the Royal Society. As editor of "Nature" and in other administrative capacities he has held for many years a unique position in scientific affairs.

FOLLOWING AN EXPLOSION near a nitro-glycerine and bromide mixing shed at the factory of Scottish Dyes, Ltd., on June 22, three men were detained in hospital with extensive burns. The report of the explosion was heard six miles away. Fire followed the explosion, and Grangemouth and Falkirk fire brigades had to be called.

DECOLOURISING ACTIVATED CARBONS, other than animal, are included in the Additional Import Duties (No. 13) Order, issued by the Treasury, which came into operation this week. The effect of the Order is to change the import duties on various commodities, the change in the case of carbons being an increase from 10 to 20 per cent.

FIGURES PUBLISHED by the Oslo Central Bureau of Statistics for the first quarter of 1933 show an increase of Norwegian imports from England from about £1,800,000 at par to £1,950,000. Similarly, a reduction of Norwegian exports to England from £2,150,000 at par to £1,400,000 is noted, as compared with last year. This means a difference in the trade balance of about £1,000,000 in favour of England. The big reduction of Northern exports to England is chiefly due to reduced sales of metals, paper and tallow.

BRITISH MANUFACTURERS have produced several special tank motor trucks with spraying equipment for locust fighting in Iraq. A tank, galvanised inside and out, mounted on a truck chassis delivers a solution of sodium arsenite through special gunmetal sprinkler heads mounted at the front of the chassis. As the vehicle moves along the poison spray is projected over a distance of 25 to 30 feet on each side. The solution can also be sprayed by hose and nozzle and provision is made for filling the tank by suction. The equipment can be used for spraying other liquids, for example, fresh or sea water for road spraying or washing.

NO CHANGE WILL BE MADE before December 31 in the prices charged by the Methylating Co., Ltd., for methylated spirits. The prices for the remainder of the year are: Industrial, 61 O.P., 1s. 8d. to 2s. 3d. per gal., according to quantity; 64 O.P., 1s. 9d. to 2s. 4d.; pyridinised industrial, 61 O.P., 1s. 10d. to 2s. 5d.; 64 O.P., 1s. 11d. to 2s. 6d.; mineralised, 61 O.P., 2s. 9d. to 3s. 3d.; 64 O.P., 2s. 10d. to 3s. 4d.; methylated resin finish, 2s. to 2s. 8d.; methylated shellac finish, 2s. 2d. to 2s. 10d. Industrial methylated spirits of 66, 68 and 74 O.P. can be supplied at 1d., 2d., and 4d. per gal. respectively over the prices quoted for 64 O.P. strength.

THE SCOTTISH NATIONAL DEVELOPMENT COUNCIL, which has been exploring the possibilities of securing premises in London for the display of Scottish manufactured goods, is to co-operate with British Industries House, where all British products are to be represented. British Industries House is the building previously occupied by Gamages (West End), Ltd., and the enterprise now proceeding is to establish it as a wholesale trade buying centre for Britain. The chairman's committee of the Scottish National Development Council has decided to commend British Industries House to Scottish manufacturers as a means of obtaining the maximum publicity for their goods.

COMPENSATION AND COSTS amounting to £160 were awarded to Mrs. Fairweather, widow of Ernest Fairweather, a dyer's labourer, of Kirkstall, Leeds, in a Workmen's Compensation Act application at Leeds County Court on June 23. The case was settled by agreement with the respondents, Hellewell's, Sons, Ltd., dyers and finishers, of Kirkstall Road, Leeds. It was stated that Fairweather, who had worked for the firm for several years, in December last put his hand into his pocket to take out two pieces of paper required to enable him to deal with certain pieces of cloth, and a pin pricked his thumb. Septic poisoning set in, but he continued at work until January 13. Notice of the accident was given on January 15, and the man died on January 28.

Company News

Royal Dutch Petroleum Co.—It is announced that the dividend for 1932 of 6 per cent. recently declared will be paid on and after July 5.

Edgar Allen & Co.—A net loss of £34,675 is reported for the year ended March 31 last; to this is added the debit brought forward of £43,150, making the debit to be carried forward £77,825.

Phoenix Oil and Transport Co., Ltd.—A dividend of 2½ per cent. (6d. per £1 share) and a dividend of 3.463897d. per share on the 1s. shares are announced. Payment will be made on August 1.

Standard Chemical Co. (of Canada).—A net loss of $177,104 is reported for the year ended March 31, against $16,109 for 1931-32. The floating assets total $1,086,239, against current liabilities of $186,721.

British Bitumen Emulsions.—The net profit for the year 1932 was £3,262, against £7,276 in the previous year, and £3,081 was brought in, making a total of £6,344. To tax reserve is placed £1,500, leaving to be carried forward £4,844.

Hadfields, Ltd.—The directors state that by reason of continued trade depression and the need of conserving resources, they have decided to defer payment of the preference dividend, due on June 30. No dividend has been paid on the preference shares since December 31, 1930.

Baker, Perkins, Ltd.—The profit for the year 1932 resulting from operations £66,222, together with £2,155 accrued from long credit suspense account, amounts to £68,377. The dividend on the ordinary shares is maintained at 6 per cent., £2,500 is placed to pension reserve, and £5,000 to general reserve, bringing the latter up to £90,000.

Bellis & Morcom.—The profit for the year ended March 31 last was £4,226, to which is added £275,336 brought in. The previous dividend for the year takes £1,808, and the interim of 5 per cent. on the ordinary shares £7,328. The directors recommend a final dividend on the ordinary shares of 5 per cent., making 10 per cent., tax free, for the year.

Shropshire Beet Sugar.—The report for the year ended March 31, 1933, states that the balance on profit and loss account was £15,822, to which is added the balance brought forward £9,548, making £25,370, less depreciation £10,000 and dividend on preferred ordinary shares of 3 per cent., less tax, £7,087, leaving to be carried forward £8,283.

Taylors (Cash Chemists) Trust.—The accounts for the year ended March 31 show a net profit of £30,800, against £38,039 for 1931-32. After allowing for the payment already made on account of the year's dividend on the 7½ per cent. cumulative preferred ordinary shares, the directors propose to transfer £5,000 to reserve, and to pay a further dividend of 1½ per cent. on the preferred ordinary shares, leaving the balance to be carried forward at £3,654.

Webb's Crystal Glass Co.—The report for the year 1932 shows a loss of £5,652, against £12,676 in the previous year, after charging usual rates of depreciation on operating works, and loss of one of the subsidiary companies. The balance of profit and loss account brought forward amounted to £1,683, and it is proposed to carry forward a balance of £1,155. Both the general reserve of £20,000 and capital reserve of £26,797 remain unaltered. The annual meeting will be held at Brettenham House, Lancaster Place, Strand, London, on July 3, at 12 noon.

British Glues and Chemicals, Ltd.—The net balance of profits in the year to April 30, 1933, amounted to £45,361, compared with £31,468 in the previous year and with £15,029 in 1930-31. A year's payment was made on the 8 per cent. preference shares during the period, against six months' distribution in 1931-32. This leaves the preference dividend in arrears from April 30, 1932. The annual meeting will be held at Connaught Rooms, Great Queen Street, London, on July 5, at 12 noon.

Anglo-Persian Oil Co.—After making full provision for all royalty and taxation due to the Persian Government under the recent settlement, the profits amount to £2,379,677, to which has to be added the amount brought forward of £720,129, making £3,099,806. For the year 1931 the profit was £2,318,717 and £896,676 was brought in. After providing £1,071,341 for the dividends on the preference capital, £320,829, against £501,944, for extra depreciation, £53,501 new issue expenses and again allocating £200,000 to debenture reserve fund, the directors have decided to recommend, at the annual meeting to be held on July 11, a dividend of 7½ per cent., less income tax, on the ordinary capital and to carry forward £447,259. For 1931 the ordinary shares received 5 per cent., when £100,000 was placed to amortisation reserve.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Argentina.—An individual in Buenos Aires desires to obtain the representation of United Kingdom firms for paints and varnishes. (Ref. No. 925.)

Belgium.—An agent established at Brussels wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of pharmaceutical products. (Ref. No. 912.)

British India.—A well-established manufacturers' agent in Bombay desires to undertake the representation for the Bombay Presidency of United Kingdom manufacturers of photographic materials and soaps. (Ref. No. 882.)

British India.—A firm of manufacturers' representatives in Bombay desires to undertake the representation for the Bombay Presidency of United Kingdom manufacturers of textile, paper and sugar mill stores, textile mechinery (except looms) and hardware bazaar goods. (Ref. No. 883.)

Holland.—An agent established at Overschie wishes to obtain the representation of United Kingdom manufacturers of raw materials required in pharmaceutical and chemical works. (Ref. No. 917.)

New Companies Registered

Bencol, Ltd., Coopers Buildings, Church Street, Liverpool. Registered June 24. Nominal capital, £2,000 in £1 shares. Soap manufacturers, boilers, refiners of all kinds of oils, fats and similar substances. A director: J. Porter, "Redacre," Abbey Road, West Kirby, Ches.

Burrowite Explosives, Ltd., Trago Mills, Two-Waters-Foot, near Liskeard. Registered June 20. Nominal capital, £5,000 in £1 shares. Objects: To carry on business as manufacturers of and dealers in an explosive known as "Burrowite," etc. A director: F. R. Burrows, Trago Mills, Two-Waters-Foot, near Liskeard, Cornwall.

Holman Manufacturing Co., Ltd. Registered June 23. Nominal capital £10,000 in £1 shares (5,000 preference and 5,000 ordinary). To acquire the wholesale and manufacturing section of the business now carried on by Holman, Ham and Co., Ltd., and to carry on the business of wholesale and manufacturing chemists, druggists, etc. A subscriber: P. F. Rowsell, J.P., Nutbrook, Withycombe, Raleigh, Devon.

Lansdowne Varnish and Enamel Co., Ltd. Registered June 17. Nominal capital, £5,000 in £1 shares. White lead and zinc manufacturers and merchants, paint and varnish manufacturers, oil boilers and refiners, etc. Directors: H. Talbot, 26 Ravenscroft Avenue, N.W.11; W. T. Collins.

Stuart Turnbull & Co. (Camlachie), Ltd. Registered June 10 in Edinburgh. Nominal capital, £6,500 in £1 shares. Objects: To acquire the business of Turnbull and Company, manufacturing chemists, 100 Camlachie Street, Glasgow. Directors: S. K. Turnbull, 100 Camlachie Street, Glasgow; R. B. Cumming.

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